OPERATION AND MAINTENANCE MANUAL (O&M) MANUAL GROUNDWATER/LEACHATE TREATMENT FACILITY

G&H LANDFILL SITE
MACOMB COUNTY, MICHIGAN

VOLUME I OF XI

OPERATION AND MAINTENANCE MANUAL (O&M) MANUAL GROUNDWATER/LEACHATE TREATMENT FACILITY

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VOLUME I OF XI

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G&H LANDFILL SITE
RECORD OF AMENDMENT

Amendment No.	*Date (mm-dd-yr)*	*Amendment Description*
94-1	12/23/1994	Pre-Final (95%) Design
		Draft Submission
95-2	04/21/1995	Final (100%) Design
		Draft Submission
00-3	01/03/2000	Final

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

LIST OF TABLES
(Following Text)

LIST OF APPENDICES

LIST OF VOLUMES

LIST OF VOLUMES

TABLE OF CONTENTS

1.0 INTRODUCTION

This Operation and Maintenance (O&M) Manual presents the operation and maintenance requirements for the Groundwater/Leachate Treatment Facility (facility) at the G&H Landfill Site, Macomb County, Michigan.

This manual contains descriptions of the various facility processes, systems and equipment, systems and equipment controls, operational procedures, operations data and alarm monitoring, equipment maintenance schedules, troubleshooting information, performance monitoring requirements, and facility safety requirements. It is supplementary to, and does not replace, other more detailed equipment installation, operation, and maintenance procedures and data furnished by equipment suppliers.

1.1 ACCOMPANYING DOCUMENTATION

Accompanying documentation to this O&M Manual (Volume I) is listed below. The accompanying documentation should be referenced for more detailed information on specific equipment and operations.

Description	*Volume*
• Operation & Maintenance Manual	I
• Mechanical Equipment Manuals	II
• Instrumentation Manuals	III.A
• Electrical Equipment Manuals	III.B
• PLC Panel & Motor Control Center Manual	IV
• Standby Diesel Generator Manual	V
• Clarifier (Envirex) Manual	VI
• Sanitare System Manual	VII
• Edwards Fibre Glass Manual	VIII
• PLC & SCADA Programming Manual	IX
• Computer Hardware Manuals	X
• Computer Software Manuals	XI
• Record Drawings	Drawings
• Approved Shop Drawings	On file in facility

A separate O&M plan has been produced to address the operation and maintenance requirements of the other G&H Landfill Site remedial construction components including the Site cap, barrier wall, groundwater/leachate collection systems, and wetlands mitigation.

1.2 SITE BACKGROUND

The G&H Landfill Site (Site) is located in the northeast quarter of Section 19, Shelby Township, Macomb County, Michigan. The current municipal address for the Site is 3160 23 Mile Road, Shelby Township, Michigan, 48316.

The G&H Landfill Site operated as a waste oil reclamation facility from 1955 to 1967 and a landfill from approximately 1955 to 1973. The landfill was closed to disposal activities in 1974.

The Site accepted municipal refuse and liquid and solid industrial wastes including oils, solvents, paint residues, and industrial process sludge. The volume of waste in the landfill is upwards of 2,600,000 cubic yards. It is estimated that the volume of liquid waste disposed of consisted of 90,000,000 gallons of oily wastewater and 15,000,000 gallons of non-oily liquids. The municipal waste consisted of industrial, commercial, and residential solid waste containing hazardous constituents.

The Site contained three distinct landfilled areas:

	Approximate Acreage
• Phase I landfill	44 acres
• Phase II landfill	17 acres
• Phase III landfill	8 acres

The Phase I landfill primarily received liquid and solid industrial wastes. Industrial wastes were disposed of in bulk and also in drums. Waste oils were transported to the Site by rail and tanker truck and discharged into one oil pond which was situated on the west and from there was pumped into a second pond located on the northeast portions of the Phase I landfill. Paints, varnishes, and chemical solvents were disposed of into pits located along the south central portion of the Phase I landfill. Co-disposal of liquids and refuse was suspected to have occurred in the southeastern area of the Phase I landfill prior to 1967.

The Phase II landfill was reported to contain both municipal and industrial wastes. The Phase III landfill received primarily municipal refuse.

A number of investigations were conducted at the Site commencing in about 1982 by various government agencies and consultants that culminated in a Consent Decree (CD) in the matter of the United States of America (USA) vs. Browning Ferris Industries, et al. dated May 1992.

The Remedial Action (RA) at the G&H Landfill Site pursuant to the CD consisted of the installation of the following main components:

- 80-acre landfill cap;
- source containment consisting of a leachate/groundwater collection system and barrier wall;
- downgradient groundwater extraction system;
- leachate/groundwater treatment and discharge system;
- wetlands mitigation; and
- institutional controls.

A Site Plan showing Site features following the completion of the remedial action construction is presented as Figure 1.

TABLE OF CONTENTS

2.0 FACILITY DESCRIPTION AND OPERATION

2.1 GENERAL

The groundwater/leachate treatment facility is a modified conventional activated sludge facility with aerobic sludge digestion. The facility as designed has a nominal treatment capacity of 310 gallons per minute (gpm).

The following is a summary of the main process units and mechanical units which exist in the facility:

- a transfer system consisting of a series of wet well/sump/extraction well pumps which transfer the collected groundwater and leachate to the treatment facility via dedicated forcemains. The wet well/sump/extraction well pumps pump to the facility at manually adjustable rates. The design steady state flow rates are 100 gpm from the leachate system and 210 gpm from the groundwater system;
- a primary treatment system consisting of a 1,600-gallon oil agglomeration tank and two oil/water separators to remove any light non-aqueous phase liquid (LNAPL) from the leachate flow. The leachate from the separators is combined with the groundwater flow in a 3,700-gallon mixing tank. Collected LNAPL from the primary treatment process is transferred to and temporarily stored in 55-gallon drums for subsequent off-Site disposal at an approved facility;
- a biological treatment process consisting of three aeration basins with a total volume of 90,000 ft^3 (673,200 gallons) (14,970 gal/ft./basin) which normally will operate in series. The basins contain a course bubble aeration system consisting of 27 course bubble diffusers per basin. The hydraulic retention time (HRT) in the basins at the design flow rate is 36 hours;
- a high volume, low pressure air system consisting of three 40 hp, 680 SCFM air blowers, one of which is standby, to supply air under pressure to the course bubble diffuser system in the aeration basins, various process tanks and filters;
- a clarifier system consisting of a center feed, peripheral discharge, half bridge type clarifier with a diameter of 40 feet and a side wall depth of 13.5 feet. Total volume of the clarifier is 16,965 ft^3 (160,000 gallons) with an HRT at design flow rate (no return flow) of 6.8 hours. A scum pump is provided for pumping scum from the clarifier scum collection system and scum holding tank to the sludge storage tanks;

- a sludge handling system consisting of two sludge digester/storage tanks that have a total maximum volume of 3,300 ft^3 (25,000 gallons) to stabilize sludges prior to disposal; two return activated sludge (RAS) pumps, one of which is standby, to pump the activated sludge from the clarifier to the aeration basin inlet; and two sludge handling pumps, one of which is standby, to pump the waste sludge from the digester/storage tanks to the infiltration gallery system in the landfill;
- a tertiary filtration system consisting of four multi media filters of 36 ft^2 each to filter effluent from the clarifier prior to discharge; a 1,250 ft^3 (9,350-gallon) clear well for effluent water storage required for filter backwashing; a 1,330 ft^3 (10,000-gallon) mudwell to receive and store backwash waste water; two backwash pumps, one of which is standby, flow control valve to pump treated water from the clear well at a controlled rate for backwashing of the filters; and two mudwell pumps, one of which is standby, to pump the backwash waste water from the mudwell to the aeration basins;
- a 2,000-gallon alum storage tank and chemical feed pump system to pump alum (coagulant) into the influent stream to the aeration basins or the clarifier;
- a 500-gallon phosphoric acid storage tank and chemical feed pump system to pump phosphoric acid (nutrient) into the influent stream to the aeration basins or into the return activated sludge line;
- a 1,200-gallon methyl alcohol storage tank and chemical feed pump system to pump methyl alcohol (used as a carbon source) into the influent stream to the aeration basins or into the return activated sludge stream;
- a 1,200-gallon hydrogen peroxide storage tank and two chemical feed pump systems to pump hydrogen peroxide into the influent stream to or effluent stream from the oil water separators to enhance oil/water separation, and to pump into the influent stream to the clarifier or the sludge waste stream;
- a 100-gallon polymer mixing tank with variable speed mixer and a chemical feed pump system to pump polymer into the influent stream to the tertiary filters;
- a 300 kW standby generator rated at 480 volts, 3 phase, 60 hertz and automatic transfer switch to provide standby power to the entire treatment facility and wet well/sump pumps. The generator will run for approximately 2 days on a full tank (600 gallons) of fuel;

- a potable water system consisting of three 850-gallon storage tanks, pump, and pressure tank to provide potable water to the laboratory sink, washroom, mop sink, and drinking fountain. The potable water is delivered to the facility by tank truck;
- a non-potable water system consisting of a pump and pressure tank to provide non-potable water (obtained from filter effluent line) for; pump seal lubrication; office area heat pump; and interior and exterior hose bib stations;
- a high pressure air system operating at between 80 and 100 psi to provide high pressure air to all pneumatically controlled valves and for air tool quick disconnect stations located throughout the facility;
- all facility operations are controlled by a programmable logic controller (PLC) and a supervisory control and data acquisition (SCADA) computer system with local and remote monitoring and control capability; and
- a laboratory is also located at the facility to allow for basic laboratory analyses to be conducted by the facility Operator.

Figure 2 presents the floor plan of the facility. Figure 3 presents process flow schematic for the facility.

A detailed description of the components and operation of the main process units at the facility is presented in the following sections.

2.2 GROUNDWATER/LEACHATE TRANSFER SYSTEM

Groundwater and leachate at the Site is collected by a series of subsurface pipe and media drains. The drains consist of one or more individual sections of drain pipe installed end to end to make up the longer drain alignments. Each individual drain section is connected to an 18-inch diameter HDPE standpipe or sump. There are a total of ten sumps located in three drain alignments that collect leachate from the landfill Site. A portion of one drain alignment has been superceded by the installation of several extraction wells. A conventional precast concrete wet well chamber is connected to a fourth drain alignment that collects groundwater from down gradient of the landfill Site.

The groundwater/leachate transfer system consists of 11 submersible pumps installed in the various collection system sumps and wet well and five extraction well pumps that

pump the collected leachate and groundwater to the facility for treatment through dedicated forcemains. The collection systems, sumps, extraction wells, and forcemains that make up the groundwater/leachate transfer system consist of the following:

Collection System	*Sump Nos.*	*Forcemain No.*
Leachate		
Phase III Toe Drain System	S-1, S-2, S-3	1
Watermain Drain System (includes extraction wells EW1, EW2, EW3, EW4, and EW5)	S-4, S-5	2
Leachate Collection System	S-6, S-7, S-8, S-9, S-10	3
Groundwater		
Groundwater Collection System	Wet Well No. 4	4

Each sump installation is enclosed in a precast concrete chamber with lockable hatch located at surface and consists of the following components:

- electric submersible pump;
- pitless adapter;
- pressure switch;
- check valve;
- V-port ball valve;
- galvanized piping; and
- transition from galvanized pipe to HDPE forcemain.

Each sump also contains a pressure transducer and a ball float switch that hang in the sump for automatic pump control. Precast concrete electrical vaults that contain the electrical controls for the pumps are also associated with each collection system.

The subsurface pipe and media drain that connects to sump S-4 has been superceded by the installation of five extraction wells evenly spaced along the S-4 drain alignment.

Each extraction well is equipped with a submersible well pump that discharges through a common forcemain into sump S-4.

The groundwater and leachate is pumped from the sumps through the forcemains to the treatment facility where it enters the primary treatment system.

2.3 PRIMARY TREATMENT SYSTEM

The primary treatment system monitors and records the flows entering the facility from the various forcemains, removes potential LNAPL (oil), and mixes the various flows to provide a combined homogeneous flow to the downstream biological treatment system. The main components of the primary treatment system include:

- valves and piping;
- magnetic flow meters;
- mix tank;
- oil agglomeration tank; and
- oil/water separators.

The forcemains from the various collection systems enter the facility through the north basement wall of the facility. Each forcemain entry is equipped with isolation valves and magnetic flow meters to display and record the instantaneous and totalized flows from each forcemain.

Flows from the Watermain Drain System (Forcemain No. 2) and from the Leachate Collection System (Forcemain No. 3) can potentially contain LNAPL (oil) and are therefore piped individually to the oil agglomeration tank. The oil agglomeration tank provides a hydraulic retention time (HRT) of approximately 15 minutes (at design capacity) to aid in the agglomeration of any LNAPL present.

Flow from the oil agglomeration tank is directed to two oil/water separators where any LNAPL (oil) that may be present is removed. Flow from the oil/water separators is then directed into the mix tank where it is mixed with the combined flow from the Phase III Toe Drain (Forcemain No. 1) and from the Groundwater Collection System (Forcemain

No. 4) to produce a homogeneous influent stream prior to entering the biological treatment system.

The forcemain entry piping is equipped with a bypass header system to accept forcemain cleaning swabs and direct the swabs past the flow meters and into the mix tank or oil agglomeration tank.

The mix tank and oil agglomeration tank have cone shaped bottoms with drains which allow the tanks to be drained into the mudwell when cleaning or maintenance to the tanks is required. Each tank is equipped with overflow piping that direct any overflow also into the mudwell. Each tank is equipped with vent piping to vent the tanks to atmosphere outside the facility. The mix tank has a hinged lid section to allow inspection and access into the tank. The oil agglomeration tank is a closed top tank with a removable side entry manway for access into the tank. The mix tank is provided with a course bubble diffuser to assist in the mixing of the various flows that enter the tank. Air is supplied to the diffuser from the blower system and is automatically or manually controlled by a solenoid valve. The air flow rate is manually adjustable by the use of a rotometer. The mix tank is also equipped with a temperature sensor to monitor the temperature of the combined influent flow. The HRT of the mix tank is approximately 15 minutes (at the design capacity).

The oil/water separators remove LNAPL (oil) from the flow by retaining the LNAPL that accumulates on the surface of the water in the separators and directing the accumulated LNAPL to the oil storage chambers. Coalescent packs within each separator traps the LNAPL which then floats to the surface of the separator and subsequently overflows into the oil storage chamber. The two oil/water separators normally operate in parallel, however, the oil/water separators are sized such that one separator can be isolated for cleaning or maintenance and the second separator can accept the total flow. Hydrogen peroxide can be added to the influent stream to the separators to enhance LNAPL removal. The oil storage chambers of each oil/water separator are equipped with float switches that activate on high level. Piping is provided to allow the oil storage chambers to be manually drained to a 55-gallon drum for subsequent off-Site disposal.

The oil agglomeration tank and oil/water separators can be bypassed and the flows from either or both Forcemains Nos. 2 and 3 directed to the mix tank directly if LNAPL is not present or if maintenance to the oil agglomeration tank is required.

2.4 BIOLOGICAL TREATMENT SYSTEM

The biological treatment system is a course bubble aeration design consisting of three aeration basins each containing coarse bubble aeration equipment. Troughs located at either end interconnect the basins and non-rising stem control gates are configured to control flow through the basins. Normally the three basins are operated in series, however the control gates can be opened or closed to allow operation of one, two, or three basins in either series or parallel configuration. Manual control valves on the transfer piping from the mix tank to the aeration basins are provided to direct the flow to the appropriate basin trough depending on the basin configuration selected.

The control gates are manually operated by a removable Tee-handle and are accessed though openings in the trough grating at the south end and through floor "cleanout" boxes located in the upper main floor at the north end of the basins. Floor access hatches are also provided for personnel access to the north trough should maintenance to the north trough be required.

Each basin is equipped with temperature, pH, and dissolved oxygen (DO) sensors to provide for the monitoring and control of the biological process.

Methanol (methyl alcohol) is added to the flow entering the biological treatment system to raise the BOD from about 20 mg/L to 40 or 50 mg/L. This is required to provide a source of carbon for the biological process and enhance the removal of organics. Phosphoric acid is also added to the influent flow to compensate for a deficiency in phosphates.

The aeration system capacity is based on BOD_5 and NH_3-N reduction assuming that the BOD_5 level is increased to 50 mg/L (through the addition of methanol) and NH_3-N levels are as high as 45 mg/L in the influent stream to the aeration basins.

Flow from the biological treatment system leaves the north trough and enters the clarifier system where activated sludge is settled out and returned to the aeration basins through the return activated sludge (RAS) pumps. The RAS pumps operate on a continual basis and provide up to 200 percent return flow capability but typically will operate in the range of 40 percent to 200 percent return flow rate.

The activated sludge process is designed based on a food to microorganism (F/M) ratio ranging from 0.027 to 0.04. In order to meet ammonia effluent criteria, the system is designed to operate at high solids loading and mean cell residence time in the order of 12 to 15 days.

The facility will operate best at mixed liquor suspended solids (MLSS) from 2,800 to 4,200 mg/L with return flow rates from 40 percent to 90 percent.

2.5 BLOWER SYSTEM

Three multistage, centrifugal, air blowers provide low-pressure, high-volume air for the following process units:

- the course bubble aeration systems in the three aeration basins;
- the aerators in the mix tank, mudwell, and sludge digester/storage tanks; and
- the air scour operation during tertiary filter backwashes.

Each blower is capable of an air flow capacity of 670 scfm at a maximum pressure of 7.8 psig under inlet conditions of 14.16 psig and 100°F at 40 bhp. The blowers are configured to run as lead, standby, and backup with only one or two blowers operating at a time. The blowers can operate continuously at air temperatures between -30°F and +100°F at an elevation of 705 feet above sea level.

An inlet filter silencer with replaceable dry-element type filters and a discharge silencer are provided for each blower to reduce the high-pitched whine that these type of blowers normally make. Butterfly valves on the suction and discharge side of the air blowers can be used for throttling the blowers up to 50 percent. Vacuum, pressure, and temperature gauges are provided for each blower to monitor blower operation.

2.6 CLARIFIER SYSTEM

The clarifier system consists of an exterior circular-type clarifier where the solids (activated sludge) from the biological treatment system is settled out and removed (returned to the aeration basins or is wasted to the sludge digester/storage tanks) to produce a clarified effluent that is then directed to the tertiary filters.

The clarifier is a half bridge, center feed, peripheral discharge type, designed based on maximum solids loadings of 25 lbs/ft^2/day at average flow plus 100 percent RAS return rate. The clarifier has a 13.5-foot side wall depth (SWD) to enhance settling capability, reduce upsets, and increase solids handling capability. The HRT in the clarifier (at design capacity) with no return is 6.83 hours. The clarifier is equipped with a scum sweep and box to remove floating scum from the surface of the clarifier.

As the activated sludge is settled it is continually withdrawn from the base of the clarifier by the RAS pumps and is returned to the aeration basins to maintain the desired F/M ratio. Sludge is wasted to control the process by the operation of automatic valves that redirect the activated sludge automatically from the aeration basins to the sludge digester/storage tanks based on a programmable operation set point time cycle.

The two RAS pumps are variable speed, centrifugal pumps that are configured to run as lead and backup. A magnetic flow meter is provided to monitor and display the instantaneous and totalized RAS flow rate.

The clarifier has a skimming arm for skimming the scum from the water surface into a scum box at one side of the clarifier. From the scum box, the scum flows by gravity into the scum storage tank where it is accumulated. When the accumulated scum builds up to a certain level, it is pumped by the scum pump to one of the sludge digester/storage tanks. Scum pumping is controlled by float level controls in the scum storage tank.

A turbidity meter is installed on the clarifier effluent pipe to monitor the turbidity of the clarifier effluent/tertiary filter influent.

2.7 SLUDGE DIGESTER/STORAGE SYSTEM

Two sludge digester/storage tanks are provided for storage and stabilization of waste activated sludges prior to disposal back into the landfill via the sludge handling system. The sludge digester/storage tanks use aerobic digestion to stabilize the sludges and to break down more of the volatile organics present.

Each tank has an approximate volume of 1,650 ft^3 or 12,500 gallons. Ultrasonic level sensors are provided for each tank to monitor and display the liquid level in each tank. The tanks are vented separately to atmosphere outside the facility through goose neck vents. The tanks are also interconnected by an upper opening in the common wall between the two tanks. Each tank has emergency overflow piping that will direct overflows to the building sump. Access to the tanks is provided through floor hatches located on the lower main floor.

Air provided for digestion is at the rate of 25 cfm/1,000 ft^3 (28.5 cfm/tank) and is provided by the blower system. Air volume to each tank is manually adjustable by use of rotometers and air feed to each tank is automatically or manually controlled by solenoid valves. Two 24-inch stainless steel course bubble diffusers are provided in each tank with a capacity of 30 to 40 cfm each. The northern tank is equipped with a methane gas sensor to monitor for methane gas within the sludge digester/storage tanks.

2.8 SLUDGE HANDLING SYSTEM

The sludge handling system consists of two variable speed, progressive cavity-type sludge pumps that pump waste sludge via forcemain from the sludge digester/storage tanks to the infiltration gallery system in the landfill for disposal. Sludge disposal instantaneous and totalized flow is monitored and displayed by a magnetic flow meter installed on the discharge forcemain.

The infiltration gallery system consists of six vertical, stone-filled columns constructed below grade into the central portion of the Phase II landfill. The six columns are interconnected by stone-filled trenches constructed in the landfill refuse at a depth coincident with the top of the leachate level. Above each stone-filled column at the landfill surface are precast concrete chambers where the sludge disposal forcemain is

connected to perforated drop pipes that extend down to the base of the stone-filled columns. Each forcemain/drop pipe connection has a check valve, isolation valve and cleanout port. Each chamber also contains a piezometer to allow manual monitoring of the leachate level at each stone-filled column location.

2.9 TERTIARY FILTRATION SYSTEM

The tertiary filter system consists of four independent multimedia filters that provide final effluent treatment by removing suspended solids from the clarifier effluent to 10 mg/L or less. Each filter chamber contains the following equipment:

- filter media base plate with air scour nozzles;
- filter media consisting of a layer of silica gravel, silica sand, and anthracite;
- backwash trough with drain to mudwell;
- inlet piping (from clarifier);
- effluent piping (to clearwell);
- air scour piping (from blowers);
- backwash water supply piping; and
- pneumatic control valves.

Each filter chamber is also equipped with bottom drain valves and elliptical wall hatches to provide access to the chamber bottoms for maintenance.

The filters are designed based on a conservative filter rate of 2.15 gpm/ft^2. Maximum filter rate with one cell off line for backwashing is 2.86 gpm/ft^2. All piping to and from the filters is equipped with pneumatic valves to allow fully automatic or manual operation of the filters.

A turbidimeter is installed on the filter effluent pipe to monitor final effluent turbidity. A polymer feed system is provided to permit addition of polymer to the filter influent to enhance the efficiency of the filters.

2.10 MUDWELL SYSTEM

The mudwell system consists of the mudwell tank and the mudwell pumps. The mudwell tank receives backwash waste water from the tertiary filters. The mudwell pumps pump the backwash waste water from the mudwell tank to the aeration basins.

The mudwell tank has an approximate volume of 1,330 ft^3 or 19,000 gallons. An ultrasonic level sensor monitors and displays the liquid level in the tank. The mudwell tank is vented to atmosphere outside the facility through a goose neck vent. Emergency overflow piping is provided to direct any overflow from the tank to the building sump. Access to the tank is provided through a floor hatch located on the lower main floor.

The floor of the mudwell is benched towards a common pump intake for the two mudwell pumps located outside the mudwell in the basement. The two mudwell pumps are centrifugal-type pumps which normally operate as lead and standby. An air diffuser is installed in the mudwell to provide mixing of the contents and to prevent settlement in the tank. Air is supplied to the diffuser from the blower system and is automatically controlled by a solenoid valve. The air flow rate is manually adjustable by the use of a rotometer.

2.11 CLEARWELL/BACKWASH SYSTEM

The clearwell/backwash system consists of the clearwell tank that provides storage of final effluent water for use in backwashing the tertiary filters, the backwash pumps, and the final effluent discharge piping from the facility to Wetland No. 2.

The clearwell has an approximate volume of 1,250 ft^3 or 9,350 gallons. The water level in the clear well is maintained at a maximum level by the configuration of the final effluent piping from the filters to Wetland No. 2. The water level in the clearwell will drop as the water is consumed during tertiary filter backwashes. An ultrasonic level sensor monitors and displays the liquid level in the clearwell. The clearwell is vented to atmosphere outside the facility through a goose neck vent. Access to the clearwell is provided through a floor hatch located on the lower main level.

A common pump intake in the clearwell feeds the two backwash pumps located outside the clearwell in the basement. The two backwash pumps are centrifugal-type pumps which normally operate as lead and standby. A flow control valve is provided in the backwash piping to provide automatic controlled valve opening and closing along with adjustable flow rate. A magnetic flow meter is also provided in the backwash piping to monitor and display instantaneous and totalized backwash flow.

The final effluent discharge piping consists of 12-inch diameter PVC piping that conveys the treated effluent from the facility (clearwell) to Wetland Pond No. 2. The discharge piping extends approximately 50 feet into Pond No. 2 anchored approximately 6 inches off the bottom. The submerged section of discharge pipe has two rows of 2-inch diameter dispersion holes that equalize the dispersion of the effluent into Pond No. 2 along the 50-foot length.

2.12 CHEMICAL FEED SYSTEMS

The chemical feed system consists of the following chemicals, storage tank capacities, and feed locations:

Chemical	*Storage Capacity (gallons)*	*Feed Locations*
50 percent Hydrogen Peroxide (H_2O_2)	1,200	1. influent stream to or effluent stream from oil/water separator 2. influent stream to clarifier or sludge waste stream
Methanol (CH_3OH)	1,200	• influent stream to aeration basins or return activated sludge stream
50 percent Phosphoric Acid (H_3PO_4)	500	• influent stream to aeration basins or return activated sludge stream
48 percent Aluminum Sulfate ($AL_2(SO_4)_3$-$14H_2O$)	2,000	• influent stream to aeration basins or influent stream to clarifier
Polymer	100	• influent stream to tertiary filters

A typical chemical feed system consists of the following components:

- chemical unloading/fill connection;
- bulk storage tank;
- vent piping overflow within containment;
- calibration cylinder;
- chemical feed pump;
- pressure relief valve;
- pulsation damper;
- backpressure valve;
- chemical injector; and
- piping, valves, and fittings.

The chemical feed pumps are hydraulically-backed, piston-diaphragm type dosing pumps.

The hydrogen peroxide unloading/fill connection is provided in a separate lockable stainless steel box located on the exterior south wall of the facility. The connection fitting consists of a 2-inch male quick-disconnect with lockable alloy cap. The storage tank is a 1,200-gallon horizontally mounted tank located in an enclosed fire-rated room with spill containment on the lower main floor. The storage tank is fabricated from a special aluminum alloy and all piping, valves, and fittings are stainless steel that underwent a passivation process prior to the initial storage of hydrogen peroxide.

The hydrogen peroxide system has two chemical feed pumps. Pump No. 1 can feed hydrogen peroxide into either the oil/water separator influent stream or the effluent stream. Pump No. 2 can feed hydrogen peroxide into either the influent stream to the clarifier or the sludge waste stream.

The methanol unloading/fill connection is located in a lockable stainless steel box mounted on the exterior south wall of the facility. This fill box also contains the fill connections for the aluminum sulfate and phosphoric acid. Each fill connection is labeled in the fill box and is equipped with a ball valve located on the interior of the

facility. The fill connection for the methanol consists of a 2-inch male quick-disconnect with lockable alloy cap. The methanol storage tank is a 1,200-gallon fiberglass tank located in an enclosed fire-rated room with spill containment on the upper main floor. The room is continuously vented to the exterior of the facility by an explosion-rated electric fan. The room has a leak detection system and a dedicated fire suppression system (foam spray). The piping and fittings on the methanol system are PVC.

The methanol system has one chemical feed pump that can feed methanol into either the influent stream to the aeration system or into the return activated sludge stream. A standby spare pump for the methanol system is maintained at the facility.

The phosphoric acid fill connection is a 2-inch male quick disconnect located in the same exterior stainless steel box as the methanol connection. The phosphoric acid storage tank is a 500-gallon fiberglass tank located within the spill containment area on the upper main floor. The piping and fittings on the phosphoric acid system are PVC.

The phosphoric acid system has one chemical feed pump that can feed phosphoric acid into either the influent stream to the aeration system or into the return activated sludge stream. A standby spare pump for the phosphoric acid system is maintained at the facility.

The aluminum sulfate fill connection is also a 2-inch male quick disconnect located in the exterior stainless steel box with the methanol and phosphoric acid connections. The aluminum sulfate storage tank is a 2,000-gallon fiberglass tank located within the spill containment area on the upper main floor. The piping and fittings on the aluminum sulfate system are PVC.

The aluminum sulfate system has one chemical feed pump that can feed aluminum sulfate into either the influent stream to the aeration system or into the influent stream to the clarifier system. A standby spare pump for the aluminum sulfate system is maintained at the facility.

The polymer system consists of a 100-gallon polyethylene storage/mix tank located in the basement. Polymer is added to the tank in concentrate form and mixed with water to produce a solution prior to use. The polymer tank is equipped with a funnel and

non-potable water connection in the tank lid to assist in the solution preparation. A variable speed mixer is provided for mixing the solution.

The polymer system has one chemical feed pump that can feed polymer into the influent stream to the tertiary filters. A standby spare pump for the polymer system is maintained at the facility.

2.13 BUILDING UTILITIES

2.13.1 ELECTRICAL POWER

Electrical power is supplied by Detroit Edison via a 3-phase, 13,200 volt overhead primary service from Ryan Road. A pad-mounted transformer, located north of the facility, steps the power down to a 3-phase, 480 volt, secondary service which runs underground into the facility's electrical room. The primary service is metered with the Detroit Edison meter located in the standby generator room. A separate electrical meter is also provided in the incoming panel to allow monitoring by the Operator of phase voltages, power consumption, etc.

Most of the process equipment in the facility operates at 3-phase, 480 volts. The 480 volt equipment is powered through motor starters contained in the MCC panel located in the electrical room. The collection system sump pumps, facility heating equipment and exhaust fans also operate on 3-phase, 480 volt power from a distribution panel (DP-1) located next to the MCC in the electrical room. Facility lighting, receptacles and powered louvers operate on 1-phase, 120 volt circuits from two lighting panels (LP-1 and LP-2) also located in the electrical room.

The facility is equipped with a 300 kW standby emergency generator set to provide emergency 3-phase, 480 volt power for the facility in the event main power from Detroit Edison is interrupted. The standby generator is sized to power all facility equipment and maintain the facility in a fully functional mode. A transfer switch located in the electrical room automatically switches the load between the Detroit Edison line and the standby emergency generator.

The standby emergency generator is equipped with a 600 gallon diesel fuel tank which provides enough fuel for the generator set to run for approximately two days between refills.

The facility also has an emergency lighting system that will provide emergency exit lighting for a minimum of ninety minutes on battery power should main and standby generator power be lost at the facility.

2.13.2 TELEPHONE SERVICE

The telephone service for the facility is provided by Ameritech and consists of the following voice and data grade lines:

Equipment	*Line Type*	*Number*
Facility Phone	voice	810-323-7937
Facility Fax	voice	810-323-3269
Autodialer	voice	810-323-7941
Modem	data	810-323-7945

The main facility phone is located in the control room with extensions located on the lower main floor level and in the basement of the facility.

2.13.3 POTABLE WATER SYSTEM

The facility is not connected to the local municipal water supply and therefore potable water for use in the facility is delivered to the Site by tank truck and transferred to potable water storage tanks located within the facility. The potable water system consists of the following main components:

- three 850-gallon food grade polyethylene storage tanks;
- centrifugal pump;
- pressure tank;

- pressure switch; and
- piping valves and fittings.

The potable water system services the following:

- emergency showers/eyewash stations;
- drinking fountain;
- hot water tank;
- washroom facilities;
- laboratory sink; and
- mop sink.

The total storage volume of 2,500 gallons provides a sufficient volume of water for 3 to 4 months of facility operation between subsequent water deliveries under normal conditions.

A pressure switch in the potable water pressure system monitors system pressure and will cause a non-critical process alarm to be issued should a loss of pressure in the system occur.

2.13.4 NON-POTABLE WATER SYSTEM

The non-potable water system is a separate pressure system that uses the final effluent from the tertiary filters as its water source. The non-potable water system consists of the following components:

- centrifugal pumps;
- pressure tanks;
- piping valves and fittings; and
- pressure switch.

The non-potable water system services the following:

- pump packing water for various pumps;
- backwash flow control valve;
- interior hose bib connections (for wash downs);
- exterior hydrants;
- office area heat pump;
- mix water for polymer system; and
- water for fire suppressant system.

The non-potable water system normally operates at a pressure between 40 and 60 psi. The system is equipped with a pressure switch that monitors system pressure and will cause a critical process alarm to be issued should a loss of pressure in the system occur.

2.13.5 COMPRESSED AIR SYSTEM

An air compressor located in the blower room provides high pressure (80 to 100 psi) air for operation of the pneumatic valves and also provides high pressure air to the pneumatic tool connection bibs located throughout the facility. The air compressor system is equipped with an air dryer and air filters/regulators at various locations in the system. A pressure switch in the high pressure air system monitors system pressure and will cause a critical process alarm to be issued should a loss of pressure (to below 40 psi) in the system occur.

2.13.6 VENTILATION/HEATING SYSTEM

The ventilation/heating system for the facility consists of the following main components:

- supply fans (SF-1 to SF-2);
- exhaust fans (EF-1 to EF-9);
- louvers (L-1 to L-5);

- dampers (D-1 to D-14);
- unit heaters (UH-1 to UH-8);
- duct heater (DH);
- baseboard heater (BB-1); and
- heat pump for office/lab (HP).

The ventilation/heating system is designed to supply and distribute fresh air (from outside) throughout the facility, modulate the temperature inside the facility, and provide emergency ventilation in the event of certain alarm conditions.

The sequence of operation of the ventilation/heating system for the various rooms in the facility is described in Section 3.15. The ventilation/heating components are identified on the Record Drawings.

2.13.7 BUILDING ALARM SYSTEMS

The building alarm systems include a separate combustible gas detection system and a combined fire and intrusion detection system.

The combustible gas detection system consists of the main panel, located in the control room, and two remote combustible gas sensors, one mounted in the sludge digester/storage tanks and one mounted in the MCC room. The combustible gas detection system is designed to monitor these areas for the presence of a combustible gas and is calibrated to methane. If a combustible gas concentration of 10 percent LEL or more is detected by the system, a series of ventilation fans will be activated to ventilate the facility and a discrete combustible gas detection alarm will be issued and the autodialer will commence its call out sequence.

The fire and intrusion detection systems are controlled through one main panel located on the lower main level beside the west overhead door. The fire detection system consists of remote fire and smoke sensors located in the various rooms throughout the facility. The intrusion detection system consists of magnetic contacts on each exterior doorway. Key switches located at the south and north doorways allow the Operator to

disable the intrusion detection system when the facility is attended and enable the system when the facility is not attended.

If the fire or intrusion detection systems are activated by a fire or intrusion event, a local alarm bell will be activated and a discrete fire or intrusion alarm will be issued and the autodialer will commence its call out sequence.

2.13.8 BUILDING SUMP PUMPS

The building sump is located in the basement and is the lowest collection point within the facility. Basement and lower main floor drains connect to the building sump as does the overflow piping from the sludge digester/storage tanks and mudwell. Two automatic submersible pumps located in the building sump pump the collected water from the building sump back to the aeration basins. The pumps will operate individually at approximately 40 gpm. If the flow into the sump exceeds the capacity of one pump, both pumps will operate and will pump at approximately 65 gpm. A high level float switch in the building sump will cause a critical alarm to be issued and shut down the collection systems pumps or all plant influent should the capacity of the sump pumps be exceeded or should the sump pumps fail.

2.14 FACILITY CONTROL SYSTEM

The operation of the facility is controlled and monitored by a programmable logic controller (PLC) and a supervisory control and data acquisition (SCADA) computer system. An autodialer is also provided to call out alarm conditions when the facility is unattended. The PLC and autodialer are contained in the main control panel located in the facility control room. The SCADA computer system is a desk top system and is also located on the facility control room.

The PLC is an Allen-Bradley PLC 5/40™ processor with a series of discrete and analog input and output cards located in the main control panel and remote analog input/output cards located in the various collection system control panels on Site. Spare input and output cards for the PLC are maintained at the facility.

The SCADA computer system consists of a Dell™ Pentium PC computer, modem, dot matrix printer and uninteruptable power supply (UPS). The computer software includes MS-DOS™, Windows for Work Groups™, Wonderware Intouch SCADA System™, Norton pcANYWHERE™, MS Office™, ICOM Winlogic 5™ and ICOM Winlinx™.

The autodialer is a Verbatim™ 8 channel voice recording autodialer that is programmed to monitor for alarm conditions and when detected, call out to pre-programmed phone numbers over the phone line when the facility is unattended.

The PLC, SCADA system and autodialer are all powered from the UPS. A spare PC computer, modem, and printer system has also been provided for setup as a remote terminal or as a standby equipment at the facility.

2.15 LABORATORY

The facility is equipped with a laboratory where the facility Operator can perform basic laboratory analyses related to the treatment process. The laboratory is equipped with the following equipment:

- analytical balance;
- Hach COD reactor;
- Hach DO175 dissolved oxygen meter;
- Hach DR 2010 Colorimeter;
- Hach EC30 pH meter;
- Imhoff cones and stand;
- Jar tester, programmable;
- laboratory oven ;
- laboratory microscope;
- miscellaneous reagents and solutions;
- miscellaneous glassware and accessories;
- muffle furnace; and

- vacuum pump.

The analyses typically performed in the facility laboratory include:

- ammonia nitrogen;
- chemical oxygen demand (COD);
- dissolved oxygen (DO);
- nitrate nitrogen;
- pH;
- settleability (jar test);
- phosphorous;
- sludge volume index;
- total and volatile suspended solids; and
- turbidity (high level).

TABLE OF CONTENTS

3.0 SYSTEMS AND EQUIPMENT CONTROLS

3.1 GENERAL

This Section of the O&M Manual provides a description of the operational controls for the following facility systems and equipment:

- PLC and SCADA computer system;
- collection system pumps;
- aeration blowers;
- clarifier;
- return activated sludge pumps;
- scum pump;
- tertiary filters;
- backwash pumps;
- mudwell pumps;
- sludge wasting valves;
- sludge handling pumps;
- chemical feed pumps; and
- building ventilation.

All process and sampling valves in the facility have been tagged for identification. Figures 4A and 4B present the valve identification system.

3.2 PLC AND SCADA COMPUTER SYSTEM

The operation of the facility is controlled and monitored automatically by a programmable logic controller (PLC) and a supervisory control and data acquisition (SCADA) computer system. Under normal conditions, the PLC and SCADA computer system will operate the facility automatically without the requirement for Operator attendance or intervention.

The PLC controls the operation of the facility by receiving input signals from the facility equipment and instrumentation, processing the signals through the control logic programmed into the PLC, and then sending output signals to the facility equipment (pumps, valves etc.) to operate as required.

The SCADA computer system monitors the facility operations and collects and logs the operations data (such as flow rates, tank levels, etc.). The SCADA computer system also displays real-time facility operation configurations and data through several Human-Machine Interface (HMI) screens that allow the Operator to observe and adjust facility operations. Through the SCADA computer system, the Operator can manually control individual equipment operation. Details on the HMI screens and operator controls are provided in the HMI Control Narative provided in Volume IX.

The SCADA computer system can also be accessed remotely via modem and pcANYWHERE™ software for remote monitoring and control of the facility. Remote access to the SCADA computer system via modem is password protected to authorized personnel only.

Should the PLC and/or SCADA computer system malfunction, the Operator does have the capability to operate the facility in a partially or totally manual configuration by placing the facility equipment in LOCAL control mode and physically turning equipment on and off as required.

3.3 COLLECTION SYSTEM (SUMP) PUMPS

The sumps located on the leachate collection systems and groundwater extraction system contain submersible pumps that pump the collected leachate and groundwater to the facility through individual and common forcemains.

Each of the collection systems has an associated local control panel contained in a concrete electrical vault (EV) located adjacent to each system as follows:

Collection System	*Local Control Panel*
Phase III Toe Drain System (Forcemain No. 1)	CP-1
Watermain Drain System (Forcemain No. 2)	CP-2
Leachate Collection System (Forcemain No. 3)	CP-3
Groundwater Extraction System (Forcemain No. 4)	CP-4

Power to each local control panel comes from distribution panel DP-1 located in the MCC room of the facility.

The local control panels have HAND-OFF-AUTO selector switches for each pump controlled by each panel. If the selector switch for a pump is in AUTO, the pump is available for automatic operation and can also be controlled manually by the Operator through the SCADA HMI (collection system) screens. If the selector switch is in OFF or in HAND, the pump is not available for automatic operation or SCADA HMI control. The pump can be operated manually by placing the selector switch in HAND at the local panel.

Pumps in sumps 1, 2, and 3 on the Phase III Toe Drain System (CP-1) and sumps 4 and 5 in the Watermain Drain System (CP-2) will cycle on and off to maintain these drains in a dewatered condition. The PLC will control a pump start and stop based the liquid level in the sump determined by the level transducer (start and stop levels are Operator adjustable through the SCADA HMI (Collection System) screens.

The extraction well pumps, which discharge into sump S-4 are not individually controllable from the facility, but instead, operate automatically in conjunction with the operation of Sump S-4 (i.e., if sump S-4 is shut down, the extraction wells are also shut down). Each extraction well has an associated local control panel with a HAND-OFF-AUTO selector switch and a water depth readout.

Pumps in sumps 6, 7, 8, 9, and 10 on the Leachate Collection System (CP-3) and in wet well 4 on the Groundwater Extraction System (CP-4) are designed to run on a continuous basis.

Manually adjustable control valves located in the sump chambers control the pumping rate, which controls the desired draw down in the sump. If the low level float switch is

activated due to a low liquid level in the sump, the pump will be shut off and a non-critical process alarm will be issued.

If the flow rate drops below a low-flow set point in any of the forcemains as measured by the individual forcemain flow meters, a non-critical process alarm will be issued. If the pump pressure switch and the starter run contact for a pump do not close within 30 seconds of the pump start command, the pump will fail and a non-critical process alarm will be issued.

3.4 AERATION BLOWERS (M-1, 2, 3)

Three multistage, centrifugal, air blowers provide low pressure, high volume air for the following process units:

- the course bubble aeration systems in the three aeration basins;
- the aerators in the mix tank, mudwell, and sludge digester/storage tanks; and
- the air scour operation during tertiary filter backwashes.

Typically, two blowers are for duty service with one as standby. One blower operates at all times. The lead blower is selectable by the Operator using a selector button on the SCADA HMI (AERATION) screen. The two remaining blowers are designated as standby and backup in sequence, respectively.

Each blower has a HAND-OFF-AUTO selector switch at the main MCC panel. If the selector switch is set to AUTO, the blower is available for automatic operation and can also be controlled manually by the Operator through the SCADA HMI screen. If the selector switch is set to OFF or HAND, the blower it is not available for automatic operation or SCADA HMI control. If the selector switch is set to HAND at the MCC panel then the blower will operate under manual control at the local control station (push button start/stop). When a blower is started, a 30-second time delay commences to allow the blower to come up to speed and set the pressure switch.

The blower operation is controlled automatically by the PLC based on maintaining a dissolved oxygen (DO) level between 2.0 mg/L and 4/5 mg/L (program adjustable) in

the aeration basins. If one blower is running and the DO level falls below the lower set point of 2.0 mg/L in any of the ENABLED basins for a minimum of 10 minutes then a second blower will be started. If the DO level has not increased above the upper set point of 4.5 mg/L within 1 hour then the third blower will be started if the facility is running on normal power. If more than one blower is running and the DO level exceeds the upper set point of 4.5 mg/L for a minimum of 10 minutes then one blower will be shut down.

If a second or third blower is started then the minimum cycle time (time between successive starts of the blower) will not be less than 30 minutes. If the facility is operating on standby power then a maximum of two blowers only will operate.

If the lead blower selection is changed and the new lead blower is not already running as a lag blower then it will be started, confirmed that it is running, and then the old lead blower will be shut down.

If a blower fails while running (as indicated by loss of air pressure, run contact opens, or overload relay closes) or shuts down due to high temperature, it will be replaced automatically by the standby or backup blower if available. If a blower is required and the standby or backup units are not available, then a critical process alarm will be issued. If a blower shuts down on high blower discharge temperature or due to high temperature in the windings (thermistors) a non-critical process alarm will be issued and the blower will be available for restart (if required) after an adjustable time delay of a minimum of 30 minutes.

3.5 CLARIFIER (M-10)

The clarifier system consists of an exterior circular-type clarifier with bottom rake and surface scum skimming arm driven by one gear-reduced motor.

The clarifier is designed to operate at all times during facility operation and therefore is not provided with a HAND-OFF-AUTO selector switch at the main MCC panel. A RUN-OFF selector switch is provided in a local control panel on the clarifier bridge to allow manual shut off the clarifier motor at this location.

The clarifier rake mechanism is equipped with two torque switches; high and high-high which are monitored by the PLC. The motor has overload and run contacts that are also monitored by the PLC. Effluent from the clarifier is monitored by a turbidimeter and the turbidity level is displayed on the SCADA HMI (FILTER) screen.

If a condition occurs that causes the high torque switch to be activated, a non-critical process alarm will be issued. If a condition causes the high-high torque switch to be activated, a critical process alarm will be issued. A critical process alarm will also be issued if a motor overload condition occurs.

High and high-high setpoints for clarifier effluent turbidity are Operator selectable on the SCADA HMI (FILTER) screen. If the high turbidity level set point is reached, a non-critical process alarm will be issued. If the high-high turbidity set point is reached, a critical process alarm will be issued.

3.6 RETURN ACTIVATED SLUDGE PUMPS (M-4, 5)

Two variable-speed, centrifugal return activated sludge (RAS) pumps withdraw settled activated sludge from the clarifier on a continuous basis and return the sludge to the aeration basins or "wastes" the sludge to the sludge storage/digester tanks.

Typically, the two RAS pumps operate with one as lead pump and one as standby. One RAS pump will normally run at all times. The lead RAS pump is selectable by the Operator using a selector button on the SCADA HMI (CLARIFIER) screen.

Each RAS pump has a HAND-OFF-AUTO selector switch at the main MCC panel. If the selector switch is set to AUTO, the pump is available for automatic operation and can also be controlled manually by the Operator through the SCADA HMI (CLARIFIER) screen. If the selector switch is set to OFF or HAND, the pump is not available for automatic operation or SCADA HMI control. If the selector switch is set to HAND at the MCC panel then the pump will run under manual control at the local control station (push button start/stop).

The RAS pumps have variable frequency drives that allow the Operator to select the RAS flow rate by setting a percent of full speed on the SCADA HMI (CLARIFIER)

screen. At full speed the RAS pumps are each designed to pump at approximately 200 percent of the average design capacity or 620 gpm. When the selector switch is in HAND, the RAS pump speed is not Operator adjustable and defaults to a minimum flow rate of approximately 100 gpm. The pumps may also be run on an adjustable time cycle (from 0 to 100 percent of the hour) set by the Operator also on the SCADA HMI (CLARIFIER) screen.

If the RAS flow drops below a minimum setpoint of 50 gpm (Operator adjustable between 0 and 100 gpm on the SCADA HMI (CLARIFIER) screen) for more than 30 seconds during pump operation, or if the run contact opens or the overload contact closes, the pump will fail and the backup pump will be started.

If a return activated sludge pump fails to start or fails while running as indicated by loss or lack of RAS flow, then the backup pump will be started and a non-critical process alarm will be issued. If the backup pump is not available or fails, a critical process alarm will be issued.

3.7 SCUM PUMP (M-8)

One scum pump pumps the collected scum from the scum storage tank to the sludge digester/storage tanks for subsequent disposal to the infiltration galleries.

The scum pump has a HAND-OFF -AUTO selector switch at the main MCC panel. If the selector switch is set to AUTO, the pump is available for automatic operation and can also be controlled manually by the Operator through the SCADA HMI (CLARIFIER) screen. If the selector switch is set to OFF or HAND, the pump is not available for automatic operation or SCADA HMI control. If the selector switch is set to HAND at the MCC panel then the pump will run under manual control at the local control station (push button start/stop).

The scum storage tank contains pump off, pump on, and high level ball float switches which control and monitor the scum pump operation. The scum pump will start pumping when the level in the scum tank reaches the pump on float, and will stop when the level reaches the pump off float.

If the run contact opens or if the overload contact closes during pump operation, the pump will fail. If the scum pump fails or if the high level float is activated, a non-critical process alarm will be issued.

3.8 TERTIARY FILTER OPERATION

The tertiary filtration system consists of four independent multi-media filter cells. Each filter cell has an influent pipe at the top of the cell, and a separate air scour pipe and common effluent, and backwash piping at the underdrain of the cell. The various pipes associated with each cell have pneumatic valves that open and close automatically to control the filter cell operation. The pneumatic valves can also be activated manually. Each cell also has a low level float switch located approximately 3" above the media and a high level float switch located approximately 3 feet above the media.

Typically, all four filter cells are active with each cell taking approximately one-quarter of the total flow from the inlet header pipe. Flow through each cell is affected by the head loss across the cell media and flow through a cell decreases as the head loss across the cell media increases. Backwashing of the filter cell media is performed to remove the fines buildup and restore a low head loss across the cell media.

The backwashing of a filter cell is automatic and is initiated by one of the following three conditions:

1. after a set time of 8 hours (Operator adjustable between 1 and 36 hours) has elapsed since the last backwash of the filter cell.
2. the head loss across the filter cell causes the water level in the cell to reach the high level float switch (terminal head loss).
3. the turbidity of the combined filter effluent increases above an upper set point of 9 NTU (Operator adjustable between 0 and 10 NTU).

A backwash can also be manually initiated by the Operator using a push button on the SCADA HMI (FILTER) screen.

Only one filter cell may be backwashed at any one time. Backwashing of a filter cell involves the following sequence:

- the influent and effluent valves for the cell close (the cell is taken off line);
- the air scour valve opens and the cell media is air scoured for a duration of 5 minutes;
- the air scour valve closes and all valves remain closed for a duration of 2 minutes to allow the media to settle;
- the backwash valve opens and the cell media is backwashed with water from the clear well for a duration of 5 minutes. The backwash wastewater overflows into the backwash trough which drains to the mudwell;
- the backwash valve closes and all valves remain closed for a duration of 2 minutes to allow the media to settle;
- the influent and effluent valves open and the backwash cycle is complete; and
- a counter for the filter cell on the SCADA HMI (FILTER) screen displays the accumulated number of backwashes for the cell.

The air scour and backwash flow rates are adjustable by the Operator by manually setting the flow control valves. The air scour and backwash duration's are also adjustable by the Operator using the PRESET buttons on the SCADA HMI (FILTER) screen.

The initiation of a backwash may be placed on "hold" if any of the following conditions are present:

- the level in the backwash water storage tank (clearwell) is below the set level required to complete a backwash cycle;
- the level in the backwash waste storage tank (mudwell) is above the set level to accept waste from a complete backwash cycle;
- no backwash pump is available to perform the backwash cycle; and
- another filter cell is in a backwash cycle.
- the PLC verifies that a blower is running and that the DO level in the aeration basin(s) is between the lower and upper set points;

The air scour portion of a filter backwash cycle involves the following sequence:

- the air scour valve to the filter will be opened and confirmation of the valve opening will be obtained from limit switches on the valve; and
- if the air scour valve fails to open or fails while air scouring the air scour will be aborted and a non-critical process alarm will be issued. The backwash pumping portion of the cycle will proceed as usual.

The backwash pumping portion of a filter backwash cycle involves the following sequence:

- the PLC verifies that a backwash pump is available for automatic control;
- a backwash pump is started and the emergency solenoid valve on the backwash flow control valve is energized. A 30-second time delay commences to allow the backwash pump to activate a pressure switch to provide confirmation that the pump is operating;
- after confirmation that the pump is operating, the normal solenoid on the flow control valve is energized to initiate valve opening;
- the flow control valve will be confirmed open through activation of a limit switch;
- if the pump fails to start or fails while running, or if the flow control valve fails to open or closes while the pump is running, then the pump will be shut down (all outputs turned off) and replaced with an available backup unit. The backwash pumps normally operate on an alternating basis;
- if a backwash pump fails and a backup unit is available, a non-critical process alarm will be issued. If a backup unit is not available or fails, then a critical process alarm will be issued;
- when a backwash pump has completed its pumping cycle, the normal solenoid is de-energized which starts the flow control valve to close. When the valve is approximately 90 percent closed, indicated by a limit switch on the valve, the backwash pump is turned off and the emergency solenoid valve is de-energized. If power is lost the emergency solenoid is de-energized and the flow control valve will close automatically.

If the inlet and outlet valves fail to close in preparation for a backwash cycle, the backwash will be aborted and a non-critical process alarm will be issued. If the air scour or backwash valves fail to close during a backwash cycle, the filter will be placed in fail mode, pending backwashes will be held and a critical process alarm will be issued. If a backwash is aborted before completion due to power failure or any other reason, it will be removed from the backwash queue.

A pressure switch monitors the high-pressure air system which operates all of the automatic valves. If the high-pressure air pressure drops to the lower set point of approximately 40 psi, the entire filter air scour and backwash pumping system will be shut down and a critical alarm will be issued as reliable valve operation cannot be maintained.

Individual filter cells may be disabled (taken off-line) for inspection or maintenance while the facility remains in operation by the Operator using an ON/OFF button on the SCADA HMI (FILTER) screen. During the period when one cell is disabled, the flow through each of the three remaining cells will increase to one third of the total flow from the clarifier. A filter in the OFF position may also be enabled by the Operator by activating the manual override switch on the individual pneumatic valves.

The design flow rate (capacity) of the facility is 310 gpm. During the backwashing of a filter cell, the flows through the three remaining cells will be increased up to 133 percent of their nominal rating in order to accept the total design flow. During this time, signals from the high level float switches on these three filters will be ignored.

3.8 BACKWASH PUMPS (M-15, 16)

Two centrifugal backwash pumps pump backwash water from the clearwell to backwash the filters.

Typically, the two backwash pumps operate with one as lead pump and one as backup. The backwash pumps operate on an alternating cycle basis.

Each backwash pump has a HAND-OFF-AUTO selector switch at the main MCC panel. If the selector switch is set to AUTO the pump is available for automatic operation and can also be controlled manually by the Operator through the SCADA HMI (CLEARWELL) screen. If the selector switch is set to OFF or HAND, the pump it is not available for automatic operation or SCADA HMI control. If the selector switch is set to HAND at the MCC panel then the pump will run under manual control at the local control station (push button start/stop). The local control station is to be used for pump maintenance and testing purposes only unless the backwash flow control valve is also opened manually.

The backwash pumps are operated as part of a filter backwash cycle and are controlled by the PLC. The backwash flow rate is controlled by the backwash flow control valve.

A backwash pump will fail if the pressure switch fails to close to confirm pump run status, the run contact opens, the overload relay closes or the control valve fails to open. If a pump fails it will be replaced with the backup pump and a non-critical process alarm will be issued. If the backup pump is not available or fails, a critical process alarm will be issued.

3.9 MUDWELL PUMPS (M-6, 7)

Two centrifugal mudwell pumps pump backwash wastewater from the mudwell to the aeration basins.

Typically, the two mudwell pumps operate with one as lead pump and one as backup. The lead pump is selectable by the Operator using a selector button on the SCADA HMI (MUDWELL) screen.

Each mudwell pump has a HAND-OFF-AUTO selector switch at the main MCC panel. If the selector switch is set to AUTO the pump is available for automatic operation and can also be controlled manually by the Operator through the SCADA HMI (MUDWELL) screen. If the selector switch is set to OFF or HAND, the pump is not available for automatic operation or SCADA HMI control. If the selector switch is set to HAND at the MCC panel then the pump will run under manual control at the local control station (push button start/stop). When a mudwell pump is started, a 30-second time delay

commences to allow the pump to come up to speed and activate a flow switch to confirm pump run status.

When the level of backwash wastewater in the mudwell reaches the upper set point of 5.2 feet (Operator adjustable between 5 and 9 feet) the air solenoid valve to the mudwell aerator will open for a 10-minute period (Operator adjustable between 1 and 15 minutes) to provide mixing. The lead pump will then start and will continue to operate along with the air mixing until the low level set point of 3 feet (Operator adjustable between 2 and 4 feet) is reached at which point the pump is shut off and solenoid valve is closed.

If a mudwell pump fails to start or fails while running (flow switch or run contact opens or overload relay closes), the pump will be replaced with an available backup unit and a non-critical process alarm will be issued. If the backup pump is not available or fails, then a critical process alarm will be issued.

3.10 SLUDGE WASTING OPERATION

The wasting of activated sludge is performed to maintain the desired F/M ratio in the aeration basins. Sludge wasting is controlled by the operation of automatic valves that redirect the activated sludge from the aeration basins to the sludge digester/storage tanks based on a programmable time cycle.

The sludge wasting valves can be programmed to operate a set time in seconds (0-59 sec.) and minutes (0-9 min.) out of a set number of hours (1-24 hrs.), by the Operator on the SCADA HMI (SLUDGE STORAGE) screen.

When a sludge wasting cycle begins, the sludge wasting valve (on the sludge digester/storage tank being filled) will open and the position confirmed by limit switches in the valve prior to the closing of the main RAS line valve. At the end of the sludge wasting time interval, the main RAS line valve will open and the position confirmed by limit switches prior to the closing of the sludge wasting valve. The main RAS line valve will fail open and the sludge wasting valves will fail closed.

If a sludge wasting valve fails to open, or if the main RAS line valve fails to close at the start of a sludge wasting cycle, a non-critical process alarm will be issued. If the main

RAS line valve fails to open, or a sludge wasting valve fails to close upon completion of a sludge wasting cycle, a critical process alarm will be issued. If both sludge digester/storage tanks are full then the sludge wasting will be placed on hold and a non-critical process alarm will be issued.

3.11 SLUDGE DIGESTER/STORAGE TANK OPERATION

The two sludge digester/storage tanks receive sludge during a sludge wasting cycle and also receive scum from the scum storage tank. The sludge wasting valves are controlled by the sludge wasting operation program, which automatically directs the waste sludge to one or the other sludge digester/storage tank. The scum from the scum storage tank is directed into either sludge digester/storage tank by the manual opening or closing of the scum inlet valves.

The waste sludge will be directed into one of the sludge digester/storage tanks until full, at which point sludge wasting will be switched to the other tank. If a tank becomes full during a sludge wasting cycle, the sludge wasting valve on the empty tank will open before the sludge wasting valve on the full tank closes.

After the sludge wasting valves have switched over to commence the filling of the empty tank, the outlet valve at the base of the full tank will open and pumping of the sludge for disposal by the sludge handling pumps will commence. When the sludge handling pumps have emptied the first tank, the outlet valve on the second tank will open before the outlet valve on the first tank closes to ensure an uninterrupted supply of sludge for the sludge handling pumps. Normally, the outlet valve on one tank will be open at all times.

The high and low level set points in each sludge digester/storage tank as well as tank on/off control (in service/out of service) are Operator selectable on the SCADA HMI (SLUDGE STORAGE) screen. A tank that has been turned off (taken out-of-service) will have its automatic valves over-ridden (sludge wasting and outlet valves will remain closed).

If the liquid level in a sludge digester/storage tank is above the lower level set point, the air supply solenoid valve will remain open to provide air to the tank aerator to maintain

aerobic sludge digestion conditions in the tank. If the combustible gas sensor in the sludge digester/storage tanks detects the presence of combustible gas at or above 10 percent LEL, the air supply solenoid valve will open regardless of the liquid level in the tank to dissipate the methane through the goose neck vents to outside the facility. The open/close operation of the air supply solenoid valves is also Operator selectable on the SCADA HMI (SLUDGE STORAGE) screen. The rate of air flow to each sludge digester/storage tank is manually adjustable by the Operator by rotometer and valve.

3.12 SLUDGE HANDLING PUMPS (M-30, 31)

Two variable-speed, progressing-cavity sludge handling pumps pump sludge from the sludge digester/storage tanks to the infiltration gallery system for disposal.

Typically, the two sludge handling pumps operate with one as lead pump and one as standby. The lead pump is selectable by the Operator using a selector button on the SCADA HMI (SLUDGE STORAGE) screen.

Each sludge handling pump has a disconnect only at the main MCC panel and a disconnecting HAND-OFF-AUTO selector switch on the local control panel. If the selector switch is set to AUTO, the pump is available for automatic operation and can also be controlled manually by the Operator through the SCADA HMI (SLUDGE STORAGE) screen. If the selector switch is set to OFF, the pump is not available for automatic operation or SCADA HMI control. If the selector switch is set to HAND, the pump will run under manual control at the local control panel.

The sludge handling pumps have variable-speed, DC motor controllers that allow the Operator to select the pumping rate by setting a percent of full speed on the SCADA HMI (SLUDGE STORAGE) screen. The sludge handling pumps will pump at approximately 14 gpm at full speed. When the sludge pumps are operated under manual control (selector switch set to HAND), the pumping rate is also Operator selectable through a variable speed control rheostat on the local control panel.

The sludge handling pumps operate on an intermittent basis, with the pumping duration (in minutes out of 1 hour), the pumping interval (in hours the pump will rest)

and the pumping days (in days the pump will rest before pump out cycle starts) Operator selectable on the SCADA HMI (SLUDGE STORAGE) screen.

A sludge pump will fail if the sludge flow rate drops below a minimum set point of between 4 and 8.5 percent (Operator selectable on the SCADA HMI (SLUDGE STORAGE) screen) for more than 30 seconds during pump operation, the run contact opens or the overload relay closes. If a pump fails it will be replaced with the backup pump and a non-critical process alarm will be issued. If the backup pump is not available or fails, a critical process alarm will be issued.

3.13 CHEMICAL FEED PUMPS

The chemical feed pumps are hydraulic-backed, piston-diaphragm type dosing pumps. The alcohol, alum, phosphoric acid and polymer chemical feed systems have one dosing pump each. The hydrogen peroxide system has two dosing pumps. Each dosing pump can deliver chemical to one of two feed points, which are manually selected by the Operator. Normally, the dosing pumps are flow paced based on facility flow.

Each dosing pump has a MANUAL-OFF-AUTO selector switch on the local control panel for each pump. If the selector switch is set to AUTO, the pump is available for automatic operation and can also be controlled manually by the Operator through the SCADA HMI (CHEMICAL ADDITION) screen. If the selector switch is set to OFF, the pump is not available for automatic operation or SCADA HMI control. If the selector switch is set to HAND, the pump will run under manual control at the local control panel.

The dosing pumps have manually adjustable stroke control from 0-100 percent stoke and variable-speed, DC motor controllers to provide a wide range of pump output control. When the dosing pumps are operated under manual control (selector switch in MANUAL), the pumping rate is also Operator selectable through a variable speed control rheostat on the local control panel.

The alcohol, phosphoric acid, alum and polymer dosing pumps are flow paced based on total influent flow when operating in AUTO. Hydrogen peroxide pump No. 1, which has feed points associated with the oil/water separator, can be flow paced to either the

configuration of the flows to the O.A.T. and oil/water separators. Hydrogen peroxide pump No. 2, which has feed points associated with the influent to the clarifier or the sludge wasting line, can be flow paced to either the total influent flow (clarifier feed point) or the RAS flow (sludge wasting line feed point).

When the dosing pumps are operated in AUTO, several automatic control presets are needed to be entered on the SCADA HMI (CHEMICAL ADDITION) screen for each chemical. The preset settings include:

- solution concentration (in percent);
- specific gravity (in gm/ml);
- pump maximum flow (in gallons per hour);
- stroke setting (in percent as set by adjusting knob on pump body); and
- required concentration (in mg/L).

The SCADA program will automatically calculate and display the required pump flow (in gallons per hour) and pump output (0-100 percent) based on the appropriate flow rate, and flow pace the dosing pump accordingly.

When the dosing pumps are controlled manually through the SCADA HMI (CHEMICAL ADDITION) screen, the Operator has the ability to turn the pump on or off and also manually set the pump speed (0-100 percent). The pump flow (gph) and pump output (0-100 percent) will continue to be displayed.

If a dosing pump fails to start or fails while running, a critical process alarm will be issued. Spare dosing pumps are maintained at the facility.

3.14 BUILDING VENTILATION/HEATING SYSTEM

The sequence of operation of the ventilation/heating system for the various rooms in the facility is described below. The ventilation/heating components are identified on the Record Drawings.

Treatment Room (Upper and Lower)

During the months of May through August when moderate to hot temperatures are expected, the control selector switch at ventilation control station CS-T1 is manually placed in the "summer" position. In "summer" mode, ventilation is continuous through supply fans SF-1 (1,100 cfm) through a goose neck vent in the roof, and SF-2 (5,565 cfm) through the elevated section of Louver L-2 (5,565 cfm), exhaust fans EF-1 (2,320 cfm), EF-2 (2,315 cfm), and EF-3 (2,030 cfm), providing 5.6 Air Changes per hour. Louver L-1 remains closed.

During the months of September through April when moderate to cold seasonal temperature are expected, the control selector switch at ventilation control panel CS-T1 is manually placed in the "winter" position. In "winter" mode, ventilation is continuous through exhaust fan EF-3 (2,030 cfm) and supply fan SF-1 (1,600 cfm) in combination with louver L-1 (930 cfm) providing 1.7 Air Changes per hour. The duct heater (DH) is a 20 kW heater installed in the duct work with SF-1. The duct heater is controlled by a thermostat to maintain a minimum supply air temperature of 64°F (adjustable).

Exhaust fans EF-1 (2,320 cfm) and EF-6 (2,320 cfm) are interlocked with an outdoor temperature sensor (mounted on the north wall of the building) having a single temperature set point of 50°F (adjustable). The exhaust fans EF-1 and EF-6 are enabled when outdoor temperatures are at or below the outdoor temperature set point. EF-6 is energized by the Blower Room thermostat (90°F adjustable). EF-1 is energized, through a time delay switch set 5 minutes from the start of EF-6, and de-energizes with EF-6.

The combustible gas detection system monitors the facility for the potential presence of combustible gas. Should the combustible gas detection system detect combustible gas at a minimum level of 10 percent LEL, an alarm condition will be activated and exhaust fans EF-1, EF-2, and EF-3 plus supply fans SF-1 and SF-2 will be energized to exhaust the facility. The combustible gas detection system alarm condition will override manual and thermostat control of the fans.

Ceiling mounted unit heaters (UH-1, UH-2, UH-3, UH-7, and UH-8) are located throughout the treatment room (upper and lower) to provide supplemental heat to these areas. Each unit heater heating element and a fan is controlled by its own thermostat. Each unit heater also has a summer bypass switch to operate the fan only.

Blower Room

During the months of May through August when moderate to hot temperatures are expected, the control selector switch at ventilation control station CS-T2 is manually placed in the "summer" position. In "summer" mode, ventilation is through exhaust fans EF-4 (6,100 cfm) and EF-5 (6,100 cfm) which are controlled by a dual set point thermostat and are energized and de-energized at the high set point (100°F adjustable) and the low setpoint (85°F adjustable), respectively. Louver L-5 modulates to 100 percent open with the energizing of the exhaust fans and modulates closed at the de-energizing of the exhaust fans.

During the months of September through April when moderate to cold seasonal temperatures are expected, the control selector switch at ventilation control panel CS-T2 is manually placed in the "winter" position. In "winter" mode, ventilation is through exhaust fans EF-4 (6,100 cfm), EF-5 (6,100 cfm), and EF-6 (2,320 cfm) which are controlled by single set point thermostats as follows:

- exhaust fan EF-6 is energized at the low set point of 90°F (adjustable);
- exhaust fan EF-4 is energized at the mid set point of 95°F (adjustable);
- exhaust fan EF-5 is energized at the high set point of 100°F (adjustable); and
- exhaust fans EF-4, EF-5, and EF-6 are de-energized when the Blower Room thermostat temperature reaches 85°F (adjustable).

Louver L-5 modulates to 100 percent open with the energizing of exhaust fan EF-6 and modulates closed at the de-energizing of the exhaust fans.

A ceiling mounted unit heater (UH-4) is located in the blower room to provide supplemental heat to this area.

Generator Room

On startup of the generator set, louver L-2 and louver L-4 open to provide generator room ventilation and exhaust hot air from the generator's radiator. Louvers L-2 and L-4 close on generator shutdown.

A ceiling mounted unit heater (UH-5) is located in the generator room to provide supplemental heat to this area.

Electrical Room

Ventilation in the electrical room is controlled by a "hand-off-auto" control selector switch at ventilation control station CS-T3. In "AUTO" mode, exhaust fan EF-7 (2,086 cfm) is energized and louver L-3 modulates open upon the room temperature reaching 100°F (adjustable). In "HAND" mode, the room thermostat is overridden and exhaust fan EF-7 and louver L-3 remain energized.

A ceiling mounted unit heater (UH-6) is located in the electrical room to provide supplemental heat to this area.

Office/Laboratory

Ventilation for the office/laboratory room, including heating and cooling, is provided by a ceiling mounted heat pump. The heat pump is a reverse cycle water to air heat pump which operates on water from the non-potable water system at the facility. The heat pump is controlled by a thermostat mounted on the wall of the office room.

Washroom

The exhaust fan EF-8 (100 cfm) in the washroom is energized by the wall switch.

A 1 kW baseboard heater (BB-1) provides supplemental heat to the washroom. The base board heater is equipped with a manually adjustable thermostat.

Alcohol Storage Room

The alcohol storage room is equipped with an explosion-proof rated exhaust fan EF-9 (80 cfm) which runs continuously to ventilate the storage room.

Fan Overload Alarms

Building ventilation fans SF-1, SF-2, EF-4, and EF-5 are monitored by the SCADA system for overload conditions. A failure of any of these fans will cause a non-critical alarm to be issued.

Building Temperature Alarms

Building high and low temperature thermostats monitor for temperature extremes inside the building. Activation of either the high temperature set point 100°F) or the low temperature set point 40°F) will cause a discrete high or low building temperature alarm, respectively, to be issued.

3.15 STANDBY EMERGENCY POWER

The status of the electrical power supply to the facility is monitored by the PLC. If the main power supply to the facility is interrupted, the standby emergency generator will start automatically and provide emergency power for the facility.

In the event of a main power interruption, all outputs to motor starters and automatic valves will be shut off and the standby emergency generator will be started. When the generator reaches operational state and power availability is confirmed, the transfer switch will automatically transfer load to the generator and the PLC will systematically restart the motors, automatic valves and remaining facility equipment according to the sequence specified for each piece of equipment. Specified time delays are maintained between the starting of various groups of equipment in order to maintain the starting kVA within the capacity of the generator.

When normal power has been restored for a specified time period, the transfer switch will automatically transfer load back to main power. The standby emergency generator will continue to run for a specified cool down period of approximately 20 minutes and then be shut down.

If the standby generator fails to start or fails while running, or if low fuel is detected, then a critical process alarm will be issued.

The standby emergency generator is programmed to automatically start and run for a 20 minute exercise period (not under load) on a weekly basis in accordance with the suppliers recommendations.

TABLE OF CONTENTS

4.0 OPERATIONS DATA AND ALARM MONITORING

4.1 GENERAL

The monitoring of operations data and alarm conditions at the facility involve the following systems and equipment:

- the PLC which generates operational data and initiates alarms based on inputs received from process systems and equipment;
- the SCADA computer system which monitors, logs, displays and prints a paper copy of selected operational data and alarm conditions;
- the autodialer which receives alarm output signals from the PLC, the combustible gas panel and the fire/intrusion panel and automatically dials out to preprogrammed phone numbers to prompt a response when the facility is unattended; and
- the UPS which provides uninterrupted power to the PLC, SCADA computer system and autodialer.

4.2 OPERATIONS DATA

Examples of the kind of operations data that is monitored, logged and displayed by the SCADA computer system include:

- sump or tank water levels;
- flow rates and cumulative totals;
- process flow temperature, pH and DO, turbidity, etc.;
- blower operation data;
- pump operation data;
- valve operation data;
- pressure fault status;
- level fault status; and
- equipment fault status, etc.

The SCADA computer system monitors the above operations data and displays the information in numeric and/or schematic form on the various SCADA HMI screens. The operations data is also logged into data files on a daily basis by the SCADA computer system. The data files are transferred to a removable CD by the Operator on a regular basis for permanent data storage. The SCADA computer system also includes a dedicated on-line printer that provides a printed record of various process operations (e.g., equipment start/stop times, etc.) and all fault and alarm conditions as they occur.

4.3 ALARM CONDITIONS

The alarm conditions that are monitored by the SCADA computer system consist of the following:

Process Alarms

1. Non-critical process alarms;
2. Critical process alarms;

Facility Alarms

3. Combustible gas alarm;
4. Building low temperature alarm;
5. Building high temperature alarm;
6. Fire alarm; and
7. Intrusion alarm.

The first two alarms, non-critical and critical process alarms, are not discretely identified and could be the result of a number of different process or equipment malfunctions.

The non-critical process alarms are issued when a malfunction occurs that does not affect the treatment process, such as when a pump fails but is automatically replaced by a backup pump. Non-critical process alarms are registered by the autodialer in a "status only" mode and the dial out sequence will not be initiated (i.e. the autodialer will not dial out but will report a non-critical process alarm condition if called by the Operator for a facility status report).

Critical process alarms are issued when a malfunction occurs that does affect the treatment process, such as when a pump fails and the backup pump is not available or also fails. Critical process alarms are registered by the autodialer, which immediately initiates a dial out sequence.

The critical process alarms are interlocked with the various collection system pumps so that in the event of a critical process alarm, the collection system pumps are shut down to stop the flow of groundwater and leachate into the facility. The other equipment in the facility not affected by the alarm condition will continue to operate to maintain a viable biomass in the process at all times.

The remaining five facility alarms are discrete alarms (i.e., the autodialer will identify these alarm conditions by name). When registered by the autodialer, the facility alarms will also immediately initiate a dial out sequence and will also cause the collection system pumps to be shut down.

After a fault or alarm condition is registered by the SCADA computer system, the fault or alarm condition must first be cleared, and then acknowledged by "pushing" the ALARM RESET button on the SCADA HMI (ALARM) screen to clear the alarm condition. The autodialer will continue to register the alarm condition until the alarm condition has been cleared on the SCADA computer system.

4.4 SUMMARY TABLE

Table 4.1 provides a summary of the SCADA display, logging, and alarm conditions and actions for the facility.

4.5 AUTODIALER OPERATION

The autodialer functions as an alarm monitor during the time an Operator is not present at the facility. The autodialer monitors facility functions for various alarm conditions and will initiate a call out sequence via a dedicated telephone line when certain alarm conditions develop.

The autodialer is pre-programmed to initiate a call out sequence to the phone numbers listed in Appendix C.

In the event of a critical or discrete alarm condition at the facility when unattended (Autodialer armed), the autodialer will go into an unacknowledged alarm state and will begin dialing the first of the programmed phone numbers. If the Autodialer call is not answered (or acknowledged), the autodialer will make two additional attempts at dialing the first number before switching to the second programmed number. The autodialer will dial each number three times before switching to the next programmed number in the sequence. This process is repeated indefinitely until acknowledgement is received.

To acknowledge an alarm during an alarm call, touch tone "9" is entered at the sound of the prompting beep. The autodialer will announce "Alarm is acknowledged, goodbye" and the call will be terminated. Another way for the alarm call to be acknowledged is to wait for the alarm call to end, and then call the autodialer back (at 1-810-323-7941).

After an alarm call has been acknowledged, it is important that the alarm condition at the facility be cleared or corrected otherwise the autodialer will again go into an unacknowledged alarm state after the timing out of the Alarm Reset Time (default is one hour). Correcting the alarm condition is also necessary by physically tending to the facility or possibly through remote access via a computer and pc ANYWHERE™ software.

After the physical alarm condition is corrected, the alarm condition must also be acknowledged by clicking on the Alarm Reset button on the SCADA HMI (ALARM) screen.

Detailed operation and programming instructions for the autodialer are provided in the Vertaim™ Owner's Manual provided in Volume III - Instrumentation and Electrical Equipment Manuals.

4.6 REMOTE MONITORING AND CONTROL

The SCADA computer system can also be accessed by a remotely located PC computer via modem and pcANYWARE™ software for remote monitoring and control of the facility. This capability enables the Operator (or other authorized personnel) to access the SCADA computer when the facility is not attended to check on the facility status and also to perform an initial investigation as to the nature of a process alarm that may have been issued by the autodialer. In some instances, if the fault or alarm condition has cleared itself, or if it can be cleared by the Operator by controlling the equipment through the various SCADA screens, it may preclude the requirement for immediate attendance by the Operator at the facility.

The procedures for accessing the SCADA computer by a remotely via pcANYWHERE™ are provided in Appendix C (and in Volume IX).

4.7 ALARM RESPONSE PROCEDURES

The recommended procedures for responding to each autodialer alarm (when the facility is unattended) are presented in Table 4.2. These recommended response procedures may require modification due to specific circumstances. Operator personnel should always place personal safety above facility operations when responding to alarm calls.

TABLE OF CONTENTS

5.0 MAINTENANCE

5.1 GENERAL

For the proper and reliable operation of the facility, a regularly scheduled preventative maintenance program for all facility equipment will prevent many problems such as equipment breakdown, facility shutdowns, or serious damage to equipment.

Many of the critical pieces of equipment provided for the facility have backup or duplication so that shutdown of any equipment for maintenance or repairs can be scheduled without interrupting the normal operation of the facility.

This section discusses general maintenance procedures and explains a recommended record keeping system to assist in the maintenance program. A summary of many items requiring routine maintenance and/or calibration is also included to assist Operators. For maintenance requirements, maintenance intervals, and lubricants for specific equipment reference should be made to the detailed installation, maintenance, and parts lists provided by the manufacturers, which are provided under separate cover.

Here, the emphasis will be on preventative maintenance and adjustments or calibrations required or recommended to minimize problems with the operation of the facility.

5.2 MAINTENANCE OF FACILITY AND EQUIPMENT

Preventative and corrective maintenance requires skill, experience, and care in reviewing documentation included with equipment to ensure an effective maintenance program.

The maintenance program should generally follow these guidelines:

- maintain a clean, neat and orderly facility;
- establish a systematic routine for daily inspection, observation, and regular maintenance items;
- establish a routine schedule for inspection, calibration, and lubrication of equipment;

- maintain accurate data and records for each piece of equipment and record any unusual occurrences;
- maintain a complete list of model number, serial number, manufacturer, supplier, lubricants, lubrication intervals, and other critical data for each piece of equipment. Record changes made to any equipment such as to pump impeller diameters etc.;
- observe all safety precautions and proper shutdown procedures when performing maintenance or other work on equipment. Maintain all guards in place after completion of maintenance or other work;
- stock an adequate supply of spare parts, lubricants, and disposables; and
- maintain an adequate supply of treatment chemicals with sufficient allowance for expected delivery times.

Accurate and complete records are essential to a successful maintenance program. Records provide information on high maintenance items and on spare parts to keep in stock and can be used to project required maintenance before complete failure of a part. Records should include regular inspections, cleaning, lubrication, replacement of worn parts, and any other relevant information.

A master list of regular maintenance, lubrication schedules, and calibration or adjustment requirements should be maintained to assist in planning work and should be updated, according to experience, for each piece of equipment.

To provide backup for the maintenance program, relevant information for each piece of equipment in the facility should be kept in a separate file and organized for easy reference. Files and facility drawings should be carefully reviewed before working on equipment. Files should contain the following:

- dimensional drawings, weights, and specifications of equipment if available;
- manufacturer's installation instructions;
- manufacturer's maintenance instructions and parts lists;
- equipment operating instructions and troubleshooting procedures. Detailed checklist for isolation and preparation for maintenance must be followed;

- model number, serial number, performance data, manufacturer, supplier, bulletins, and other relevant data;
- warranty and guarantee information along with certified test data or curves; and
- an up-to-date list of spare parts in stock. Maintain an adequate supply of approved lubricants where required.

All maintenance, adjustments, calibration and lubrication should be carried out strictly as per manufacturer's instructions.

5.3 TOOLS AND TOOL STORAGE

Effective maintenance requires that the proper tools are available and maintained in good, clean condition. Most of the necessary tools for maintenance and calibration of equipment at the facility have been provided along with tool bench and tool storage cabinets. Tools removed for use should be returned to the proper storage place and their removal from the facility for use in other locations should be discouraged. Where more than one person has access to tools a checkout system should be used so that tools are not lost and are available when needed.

Specialty and delicate tools and instruments will be stored in a secure location with restricted access so that they will not be inadvertently damaged by poor storage. Micrometers, dial gauges, calipers, taps and dies, multi-meters, and feeler gauges are some examples of items which require care in storage.

5.4 ALTERNATION OF DUPLICATE EQUIPMENT

Duplicate units are supplied for many of the pumps, blowers, and other equipment in the facility which allow uninterrupted operation of the facility if one unit fails. Since backup equipment is not required on a regular basis it is important that equipment not stand idle for long periods. Periodic operation maintains equipment in working order and prevents possible damage due to moisture and flat spotting of bearings and distributes lubrication properly minimizing possible damage due to condensation and corrosion.

Where backup units are supplied for critical equipment the following guidelines will be followed. One unit will be chosen as the primary or lead unit. The standby equipment will be run regularly but for approximately 50 percent of the total operating time of the primary units up to a certain stage after which each will be run for approximately equal times. This procedure should ensure that the primary and backup units will not require major maintenance at almost the same time. Since it is impossible to predict exactly the expected operating life of various equipment some guidelines will be presented.

Wear on equipment depends on the number of start/stop cycles, the load during operation, and the RPM at which the equipment operates. Operating speed is probably the major factor in determining bearing and mechanical seal life. Equipment operating at 3,500 rpm generally will wear out bearings, sleeves, and seals faster than equipment operating at lower speeds. Motors and pumps with overhung loads such as those caused by belt drives, gear reducers, etc. may require more frequent maintenance. Equipment operating at 1,760 rpm or less will generally have longer operating life between required major maintenance. It is recommended that for equipment operating at 3,500 rpm units should be run for equal times after approximately 1 year. Equipment operating at 1,760 rpm or less should be run equally after approximately 2 years. This should insure that the most probable failure times of similar units will be approximately 6 months and 1 year apart respectively.

Equipment such as pumps and motors will be operated at least once a week for a reasonable period of time. The run time of the primary unit will be gradually increased over the backup unit for the first year or two as outlined above. After the initial difference has been established the units will run approximately equal time. This will be adjusted as experience dictates.

5.5 PUMP MAINTENANCE

Pumps and their drivers are critical to the operation of the facility. Regular inspections are to be made of all pumping units and drivers noting the following in particular:

- pump and motor bearings for temperature and noise. Excessive bearing temperatures in pumps or motors or a hot stator section in a motor may indicate serious problems ahead;
- pump operation for vibration, noise, integrity of packing, or seal flushing water lines. Motor winding temperature and any unusual noise or vibration should be noted;
- packing glands for excessive leakage or insufficient water flow or pressure to lubricate shaft sleeves and mechanical seals;
- control equipment operation and condition and pump suction and outlet pressure gauge readings for normal range and operation;
- periodically check pump performance against pump curves and previous noted performance; and
- tag, disconnect, and lock out any equipment which has an obvious problem since continued operation of the equipment could lead to more extensive damage. Start the backup unit and order any necessary parts which may be required to complete repairs.

a) Pump and Blower Bearings

Some of the pumps in the facility are centrifugal pumps in which the only moving part is the shaft with impeller, impeller wear rings, inner bearing race, shaft sleeve, and coupling. The entire assembly rotates with all loads supported by the pump bearings; pump bearings are therefore critical to the proper operation of the pumping unit. Bearings should be lubricated on a regular schedule strictly according to manufacturer's instructions and using only approved lubricant.

Take all precautions not to overgrease bearings or overfill oil lubricated bearings. Over lubrication of bearings prevents proper movement of lubricant within the bearing assembly and can lead to premature bearing failure. Remove grease relief plugs and allow equipment to operate under normal conditions and temperatures to insure that bearings are not overgreased. Clean any excess grease from around relief holes and replace relief plugs after a number of operating hours.

Do not overfill oil lubricated bearings and use only the grade and viscosity of oil recommended by the manufacturer. If oil lubricated bearings have magnets to collect any fine particles check regularly for signs of metallic particles and clean magnets. Shortly after initial startup check for any filings or cuttings that could remain from machining or assembly operations.

Most pumps will come pre-lubricated from the factory but STRICTLY FOLLOW MANUFACTURER'S WRITTEN INSTRUCTIONS DURING INSTALLATION AND STARTUP. VERIFY THAT PUMPS AND BLOWERS ARE PROPERLY LUBRICATED BEFORE STARTUP and check for any signs of condensation in the lubricant or corrosion in the area of bearings. If oil or grease appears milky then water may have entered a bearing and the lubricating value of oil or grease will be nullified leading to premature bearing failure. Relief plugs should normally be removed to verify the condition of the lubricant and should be left out for the initial run in period to allow any excess grease to escape from the bearing. Tag and lock out any pump which has bearings without lubrication, lubrication which appears questionable, or which has bearings that may need repacking, further inspection, or replacing.

b) Pump Packings and Mechanical Seals

Pump shafts have either packing or mechanical seals to prevent excessive leakage about the rotating shaft. Both packings and mechanical seals require clean water for lubricating and flushing of the seals or packing. Most of the pumps installed in the facility have mechanical seals that are lubricated by pressurized water supplied from the non-potable water supply system. Check external packing or mechanical seal water lines and make sure that isolation valves are open at all times. Replace any questionable tubing or valves.

Verify that any pumps with packing are leaking slightly to insure proper lubrication and flushing of the packing and shaft sleeve. Insure that leakage is not excessive since leaking water could enter bearings or motors and cause damage. Adjust packing glands as required. Normally a packing should drip approximately once every 2 to 3 seconds to provide adequate lubrication; slightly higher than normal packing leakage is preferable to not having enough lubrication. Higher rotational speeds may require looser settings with more leakage. STRICTLY FOLLOW MANUFACTURER'S RECOMMENDATIONS when adjusting packing glands. If packings are leaking excessively and glands

are snug then all of the packing should be replaced. When replacing packing use only the proper size of packing as required by the manufacturer, check shaft sleeves for wear since worn sleeves will reduce both sleeve and packing life. MAKE ABSOLUTELY SURE that the lantern ring is clean and is positioned properly in the packing to assure lubrication of the shaft.

Mechanical seals normally direct flushing water internally from the high to low pressure side of the pump casing. Any leakage at a mechanical seal indicates that the seal is probably about to fail. Mechanical seals have certain advantages over packing but they also have some disadvantages. Mechanical seals require less regular maintenance, require no adjustment and eliminate packing water running continually. They are however more expensive to replace and require more labour to replace. Mechanical seals also may fail more suddenly and with little warning.

c) Motors and Motor Bearings

Motor bearings require the same care in proper lubrication and lubrication procedure as pump bearings. In an average horizontal motor running unloaded the bearing temperature should normally be approximately 40° to 68°F above ambient air temperature where the higher temperature applies to higher rpm motors. At full load bearing temperatures should be 60° to 68°F below the motor winding temperature. Motor bearings should never run above 175° to 185°F including ambient temperature or severe damage may result. It is recommended that a careful check on any motor bearing running above 165°F be maintained. Bearings on vertical hollow shaft motors as commonly used on vertical turbine or other pumps where thrust is a factor tend to run at higher temperatures.

d) Oil and Grease Lubrication Storage

Lubrication supplied to equipment in the regular facility maintenance is only as good as the quality and condition of the lubricants used. Grease or oil containing contamination by dirt or water will only create damage to bearings and shorten their life. Oil and grease should therefore be stored if possible in original unopened containers; after opening containers oil and grease should be stored so as to keep out dirt and assure that the proper grade is shown. Oil or grease which has any possibility of contamination by dirt or water etc. or for which the

grade and type is not known should NOT be used for machine lubrication purposes. Plastic screw top containers are the best method of purchasing oil for maintenance purposes since they are easily resealed; they should be stored in a dry area where condensation is not a problem. Grease should be purchased in cartridges. If different greases are required for different equipment then separate clearly marked grease guns should be used for each type of lubricant. Most manufacturers specify the type of lubricant to be used and also may give approved brands.

5.6 ALIGNMENT OF EQUIPMENT AND DRIVERS

Alignment of pumps and motors, compressors and motors, or other equipment and their electrical or engine drivers is critical to long bearing life and reliable, trouble-free operation. Pumps or compressors and motors, generators and engines, pumps and engines should all be aligned well within the manufacturers limits for both angular and lateral misalignment. Normally equipment is shipped from the factory pre-balanced and having the driven unit and driver properly aligned. Alignment may be altered in shipping or during installation and grouting of the equipment base. Alignment should be verified to be well within manufacturer's written instructions prior to startup of the equipment. Both angular and lateral alignment must be verified. If problems are encountered in obtaining proper alignment then both driver and driven equipment should be checked for faulty bearings or distorted shafts or couplings.

Prior to checking alignment of pumps and motors or other equipment the orientation of the shafts and coupling should be carefully marked since the balancing of the equipment may be altered if couplings and shafts are not located as they were balanced at the factory. This could lead to vibration even if equipment is properly aligned. STRICTLY FOLLOW MANUFACTURER'S INSTRUCTIONS ON INSTALLATION, ALIGNMENT, AND STARTUP OF ALL EQUIPMENT.

5.7 BLOWER MAINTENANCE

Blowers provided for diffusing air through the aeration basins are multistage, centrifugal type blowers. Follow manufacturer's instructions contained in the

Operations and Maintenance manuals for instructions on maintenance of the blowers. Regularly service intake filters and lubricate as required. Check outlet pressure when operating for normal level. Maintain the blowers and associated piping and supports in clean condition. Check adjustment of blower discharge pressure and temperature switch as required.

5.8 STANDBY GENERATOR MAINTENANCE

The standby diesel generator set will supply standby power for all operations at the facility. A separate manual for operation and maintenance of this equipment is provided by the manufacturer (VOLUME V).

Fuel used should be No. 2 diesel fuel as specified in ASTM D975. Keep the fuel tank full at all times to eliminate/minimize condensation. Follow oil change and other service intervals for "standby" service. All mechanical service or major maintenance should be provided ONLY by authorized service representatives. Use only approved fuel and air filters as designated in the service manual. Non-drive end bearings normally do not require regreasing and these bearings must be dismantled if regreasing is required. Perform routine insulation resistance testing particularly following long periods of non-operation. Refer to Operation and Maintenance manual in the separate volume provided. Maintain all associated equipment as required.

5.9 ELECTRICAL SYSTEM MAINTENANCE

Only trained personnel should work on electrical equipment even after equipment has been isolated from the supply. Most electrical failures in motors and other components are caused by dirt, moisture, corrosion, lack of use, friction, or vibration. Particular care must be used in maintenance of H/D lamps, electronic drives' and capacitor corrected starters.

A routine maintenance program should be implemented to maintain electrical motors and other equipment in a clean, dry condition. Regularly check facility phase voltages and amperages on all three phases and report any unusual difference in voltages or

amperages between phases. Observe any "chatter" in the contacts or "buzzing" in electrical motor starters or fusible/unfused disconnects.

Operating personnel should be thoroughly versed in the proper procedures for operation of the electrical and control equipment. They should be familiar with electrical safety and proper procedures for isolating and locking out disconnects. A regular electrical maintenance program should be implemented for equipment based on the duty cycle which includes the following:

- a regular cleaning program is essential to maintain electrical equipment in proper working order. Clean the exterior of electrical and control enclosures regularly to prevent dirt, oil, and dust from entering when cabinets are opened by qualified personnel;
- check motors for overheating, uneven temperatures around the stator area, bearing noise, dirt around open drip-proof and fan cooled motors, loss of phase, and amperage on each phase. Note any unusual conditions or indicating lights to be replaced;
- check motor starters for grounds, loose connections, pitted or corroded contacts, cleanliness of the starter cabinet, thermal overload relays, overload heaters, fuses and fuse clips etc.;
- check electrical cords or receptacles for signs of overheating or mechanical damage, check for unduly noisy ballasts or for lights which require bulb replacement. Check ground fault receptacles and/or breakers prior to use and regularly check operation of the emergency lighting system;
- manually operate or change selection of the lead pumping or other unit to insure that all equipment is run at reasonable intervals;
- where alarm test circuits are provided make frequent checks that alarms are operating properly. Run fans manually if necessary at regular intervals to check operation, check damper motors and warm motors and windings to dry out any condensation;
- check the emergency standby power system as recommended by the standby generator set manufacturer to verify operation of the automatic transfer switch and diesel standby set. Check line phase voltages and amperages under load; and

- inspect motor windings for insulation cracks and for dust and dirt in cooling passages. Megger windings yearly and check with readings when new. Megger critical electrical supply circuits. After any maintenance work check motor rotation before restoring to service.

5.10 PERIODIC MAINTENANCE

5.10.1 AS REQUIRED

a) Investigate any alarm condition and take corrective measures or adjust operation of the system or facility as required.

5.10.2 WEEKLY MAINTENANCE

a) Make a general inspection of the entire facility observing operation of all equipment and note any irregularities. Report any required maintenance or other irregularities in any equipment or operation. Log any unusual or suspicious operation of any equipment or controls. Order any necessary spare parts if required. Check motors and pumps for abnormal temperature, vibration or noises. DO NOT PLACE HANDS NEAR MOVING PARTS while checking. Inspect pump packings and mechanical seals and external seal/packing flushing lines.

b) Check chemical systems for correct operation and calibration. Assure that pump suction lines are free of air, that sufficient chemical is available, and that all feed lines and connections are free of leaks.

c) Make a visual check on clarifier level and aeration basin levels, for any abnormal condition.

d) Check a filter backwash visually for correct operation and check air scour flow rate and backwash flow rate. Check that no media is being washed into the backwash trough.

e) Verify that visual readings where available agree with information displayed on SCADA display. Calibrate equipment as required if there are any discrepancies. Record date and time of calibration.

f) Check for any non-critical process alarm conditions and correct reasons for alarm as soon as possible.

g) Perform any regularly scheduled maintenance or lubrication and update equipment records and spare parts inventory.

h) Clean turbidimeters.

5.10.3 MONTHLY MAINTENANCE

a) All pumps with packings or mechanical seals should be carefully checked for excessive noise or unusual condition. Adjust packings if leakage is excessive. Mechanical seal and packing lubrication water lines should be carefully checked for leaks or cracks and should be replaced with equal materials if required. Carefully check pumps and motors for proper operation.

b) Check that all indicator lights are operating on starter and control panels. Check phase voltages and amperages and note any unusual readings or imbalance with normal operating loads.

c) Shut off power to blower, tag and lock out disconnect. Check and service air filter or replace if required. Carefully remove filters and clean with compressed air by blowing out from the inside of the filter or carefully vacuum off outside of filter, check for holes in the filter using a bright light, and replace any filters with holes. Also replace filters that will not clean properly or that become caked. MAKE ABSOLUTELY SURE THAT NO FOREIGN MATERIALS such as paint chips rust etc. have accumulated inside the filter compartment and BE SURE that all gaskets, seals, and washer seals are in place when completed. Verify that air blower relief valves operate smoothly and that pressure gauges are operational. Vacuum pressure gauges have been installed on blower intakes to measure relative headloss across filter. Do not remove gages without closing shutoff cocks or turning blowers OFF at disconnect switches.

d) During standby generator set operation verify that temperatures and oil pressure are normal and that all other operation is normal. Check oil, radiator, and fuel levels after running the set and add fluid as required using only manufacturer's approved lubricants and recommendations. Check battery level and operation of

charging system. Add DISTILLED water as required. Check fuel system for any leaks.

e) Exercise all valves which are not regularly used to prevent valve seats "freezing" due to lack of use. Note irregular operation of any valves or leaks at packings.

f) Check all ground fault receptacles or ground fault breakers for proper operation. Have any defective receptacles or breakers replaced immediately. Verify that all emergency lighting systems are operating properly.

g) Update all spare parts, disposables, and chemical inventory and order any spare parts, disposables (including laboratory test chemicals), and treatment chemicals that are required.

h) Inspect fire extinguishers for full charge and pressure.

5.10.4 THREE-MONTH INTERVAL MAINTENANCE

a) Check and clean electric heater units and fans etc.

b) Check and clean clarifier weir and trough.

c) Check and clean/replace air filters for blowers:

d) Adjust alternation of standby equipment as necessary to stagger hours of run time.

e) Calibrate all instrumentation to standards.

f) Complete any regularly scheduled equipment maintenance as recommended by manufacturer.

g) Check headlosses on the tertiary filters after a backwash and compare to normal values.

5.10.5 YEARLY OR BY OPERATING HOURS MAINTENANCE

a) Drain oil water separators, oil agglomeration tank, mix tank, aeration basins, clarifier, filters, and clean and inspect concrete structures and mechanical parts. Patch defective concrete, repair or replace defective parts, and paint or grease metal parts as required.

b) Check the complete electrical system including motor starters, fusible and non-fusible disconnects, breakers, ground fault receptacles, electrical connections, motor phases for amperage, and megger all critical circuits with appropriate meter.

5.11 GENERAL FACILITY MAINTENANCE

In addition to the mechanical and electrical plant the remainder of the facility requires regular maintenance. Maintain the facility in clean condition and regularly clean windows and wash and wax floors as required. Other items which require regular maintenance include but are not necessarily limited to the following:

- grounds, outdoor access, and fence maintenance;
- maintenance of doors, hardware, laboratory, and bathroom fixtures;
- roof and flashing should be inspected regularly;
- dispose regularly of dirty or oily rags and clean oily rag containers;
- dispose of trash or obstructions from all access areas and means of egress;
- properly store all flammables, paints, solvents, lubricants, etc.; and
- clean any area immediately after maintenance or other work.

5.12 EQUIPMENT MAINTENANCE AND INSTRUMENT CALIBRATION SCHEDULES

Equipment maintenance and instrument calibration schedules are provided in Tables 5.1 and 5.2 respectively. Tables 5.1 and 5.2 provide a summary of the process equipment and instrumentation in use in the facility and the frequency of maintenance and calibration for each piece of equipment.

The information contained in Tables 5.1 and 5.2 was obtained from the manufacturer's documentation that was supplied with the equipment and instrumentation. All maintenance and calibration work is to be conducted in accordance with the manufacturer's instructions and is to be logged in the facility's Operations Log Book and in a separate Maintenance and Calibration Log Book.

TABLE OF CONTENTS

Page

6.0 TROUBLESHOOTING

6.1 GENERAL

This section presents potential operating problems and suggests possible sources of the problems and recommended solutions. The potential operating problems are summarized in Table 6.1.

Facility Operator personnel should record operating problems and the subsequent solutions to the problems when they occur and attach to this section of the O&M Manual for future reference.

TABLE OF CONTENTS

7.0 MONITORING AND REPORTING REQUIREMENTS

7.1 GENERAL

The monitoring and reporting requirements for the operation and maintenance of the facility are set out in the following documents:

- Consent Decree (CD) and its accompanying Scope of Work (SOW) for the G&H Landfill Site, dated May 1992; and
- Substantive Requirements Document (SRD) issued by the Michigan Department of Environmental Quality (MDEQ) dated June 16, 1999 (revised from original dated July 30, 1998).

The SOW's specified reporting requirements deal primarily with operation and maintenance activities performed at the facility. The SRD stipulates the discharge criteria for the facility and specifies the monitoring and reporting requirements primarily for the facility influent/effluent and wetlands monitoring.

In addition to the agency required monitoring and reporting requirements defined in the SOW and SRD, a performance and optimization monitoring program has been implemented at the facility for the purposes of monitoring and optimizing the treatment process.

7.2 SOW REQUIREMENTS

The SOW specifies that, as a minimum, quarterly progress reports are to be prepared and submitted to the EPA and MDEQ that contain the following information related to the operation and maintenance activities conducted on Site:

- summaries of all findings;
- summaries of all contacts with representatives of the local community, public interest groups or state government during the reporting period;
- summaries of all problems or potential problems encountered during the reporting period;

- actions taken being taken to rectify problems;
- changes in personnel during the reporting period, including qualifications;
- projected work for the next reporting period; and
- copies of daily reports, inspection reports, laboratory and monitoring data.

A copy of the SOW is provided in Appendix A.

7.3 SRD REQUIREMENTS

The SRD specifies the final effluent limitations (discharge criteria) and also the monitoring and reporting requirements for facility operation. The various sections of the SRD are summarized below:

Section A: **Limitations and Monitoring Requirements**
- this section specifies the parameter list, loading and concentration limits, frequency of analysis and sample type for influent, effluent, and wetlands monitoring.

Section B: **Monitoring Procedures**
- this section specifies the test procedures and results recording requirements.

Section C: **Reporting Requirements**
- this section specifies various notification requirements and the schedule for results reporting.

Section D: **Management Responsibilities**
- this section specifies other requirements such as Duty to Comply, Operator certification, facilities operation, etc.

Section E: **Activities Not Authorized by This Permit**
- this section lists activities that may be associated with the operation of the facility that are not authorized by the SRD permit.

Operator and monitoring personnel are directed to reference the latest version of the SRD (as may be amended from time to time) for the current monitoring and reporting requirements.

A copy of the SRD is provided in Appendix B.

7.4 PERFORMANCE AND OPTIMIZATION MONITORING

A separate performance and optimization monitoring program was implemented upon start up of the facility to monitor treatment performance and allow optimization of the treatment process. The performance and optimization monitoring is performed over and above the monitoring specified in the SRD, however, the results of this monitoring is also to be reported to the Agencies as specified in Section C.4 of the SRD.

Operator and monitoring personnel are directed to reference the latest version of the Performance and Optimization Monitoring Program (as may be ammended from time to time) for the current monitoring and reporting requirements.

TABLE OF CONTENTS

8.0 HEALTH AND SAFETY PLAN

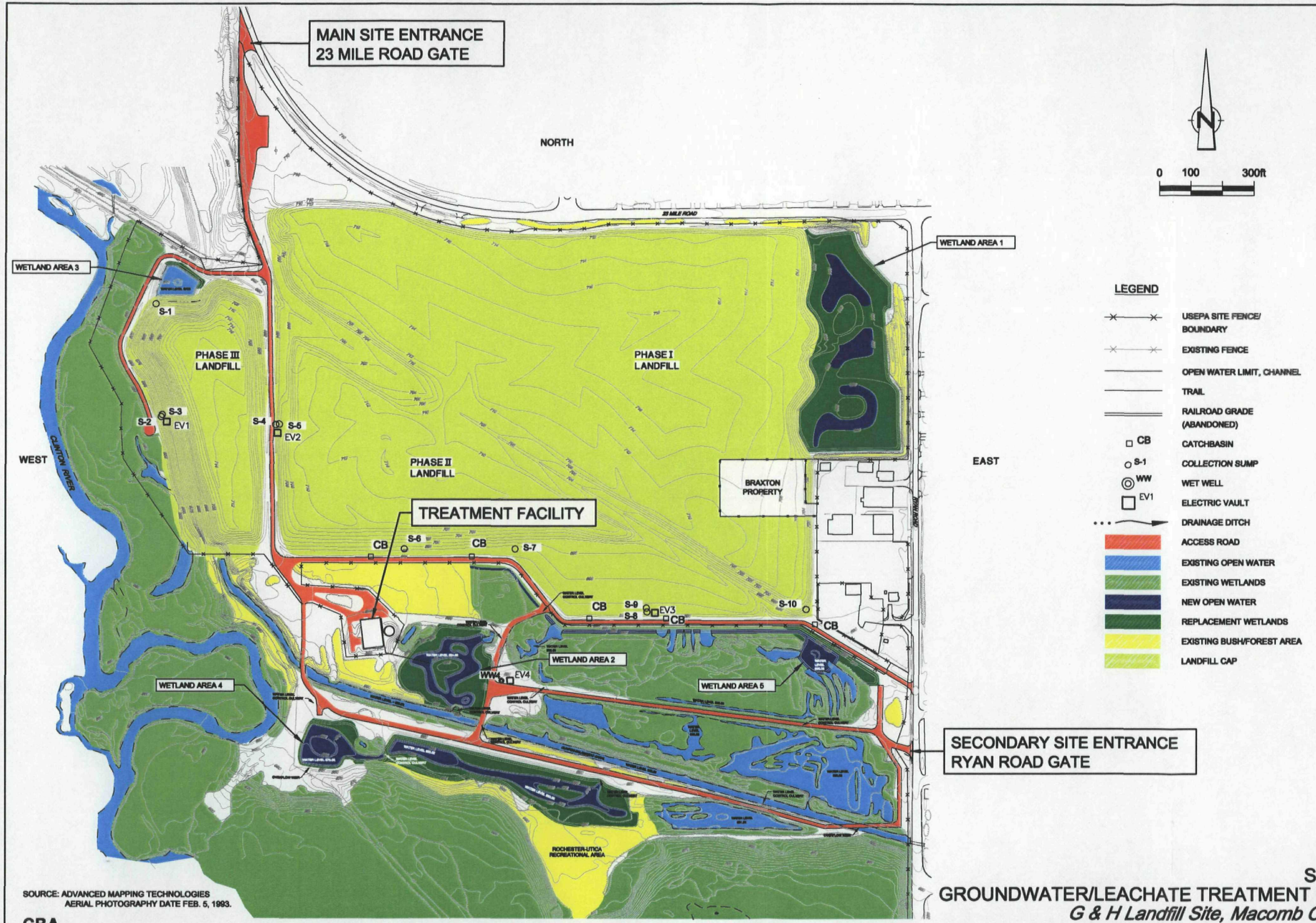
The Health and Safety Plan (HASP) describes the health and safety procedures to be implemented during the long-term operation, maintenance and monitoring of the G&H Landfill Site groundwater/leachate treatment facility.

The facility is operated on a continuous basis but is expected to require only periodic on-Site attendance by Operator personnel due to the automated control of the facility. It is anticipated that on-Site Operator attendance will consist of 1 to 3 days per week, on average, to perform the required inspections, monitoring and routine maintenance activities. Responses to operational problems and/or equipment malfunctions may result in more frequent Operator presence at the facility.

The treatment system at the facility is a contained system, and as such, there is no routine handling of, or exposure to, contaminated material during normal facility operations. However, during certain maintenance and monitoring activities, personnel may come in contact with groundwater/leachate that may contain hazardous substances.

The health and safety procedures and emergency response plans established for the long-term operation and maintenance (O&M) of the facility are contained in the HASP provided under separate cover.

FIGURES



SOURCE: ADVANCED MAPPING TECHNOLOGIES
AERIAL PHOTOGRAPHY DATE FEB. 5, 1993.

CRA

06967-21(017)GN-WA001 SEP 01/1999

figure 1

SITE PLAN
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H Landfill Site, Macomb County, MI

LEGEND

- F — FIRE EXTINGUISHER
- P — FIRE PULL STATION
- E — EMERGENCY EYEWASH/SHOWER
- TELEPHONE

HYDROGEN PEROXIDE (50%) STORAGE ROOM FIRE RATED 1200 GAL TANK

ALUMINUM SULPHATE (48%) 2000 GAL TANK

METHANOL STORAGE ROOM FIRE RATED 1200 GAL TANK

PHOSHORIC ACID (50%) 500 GAL TANK

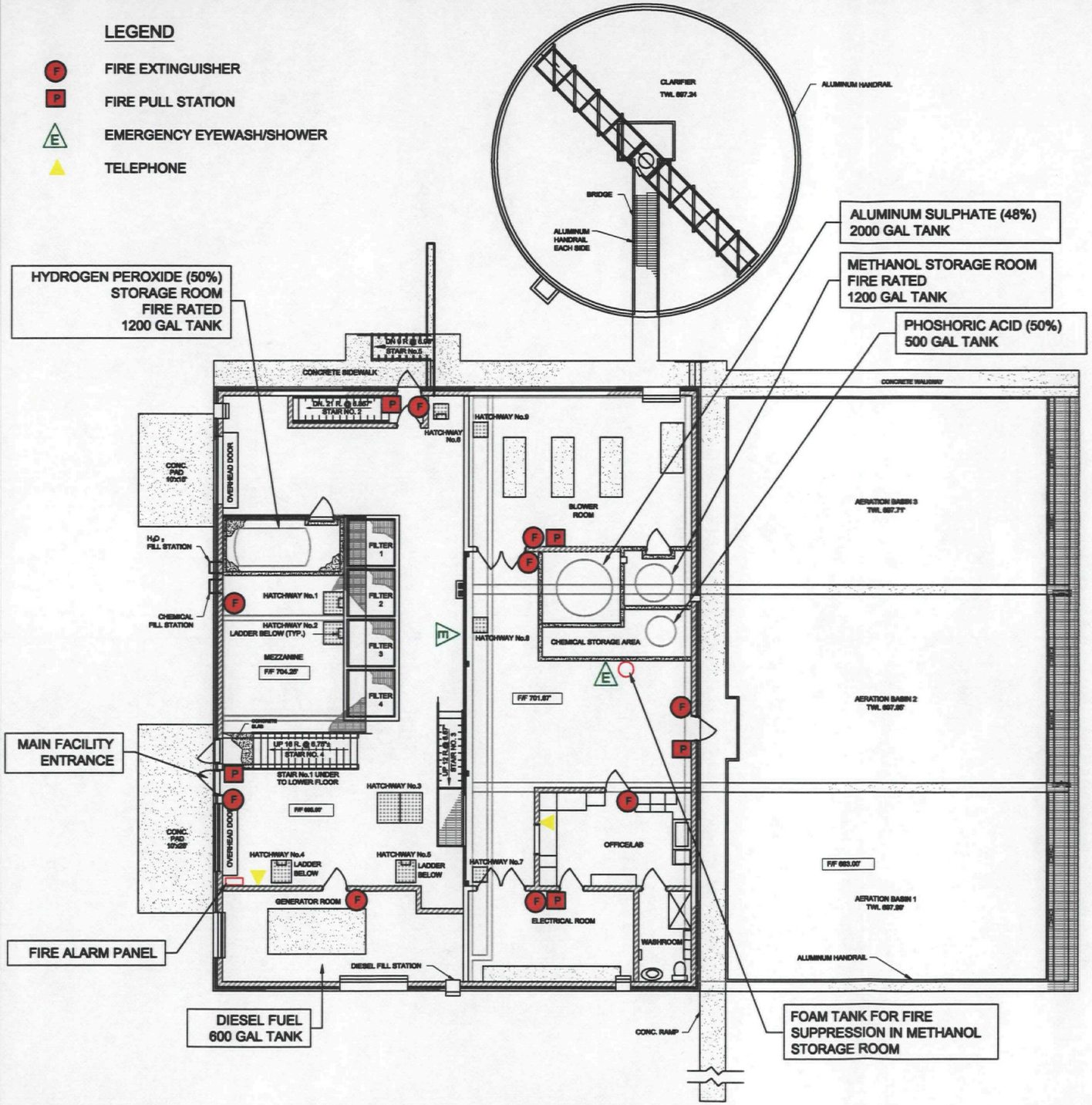
POLYMER 100 GAL TANK

MAIN FACILITY ENTRANCE

FIRE ALARM PANEL

DIESEL FUEL 600 GAL TANK

FOAM TANK FOR FIRE SUPPRESSION IN METHANOL STORAGE ROOM



OVERALL MAIN FLOOR PLAN

LOWER FLOOR PLAN

figure 2

FLOOR PLAN
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H Landfill Site, Macomb County, MI

CRA

06967-21(017)GN-WA002 NOV 15/1999

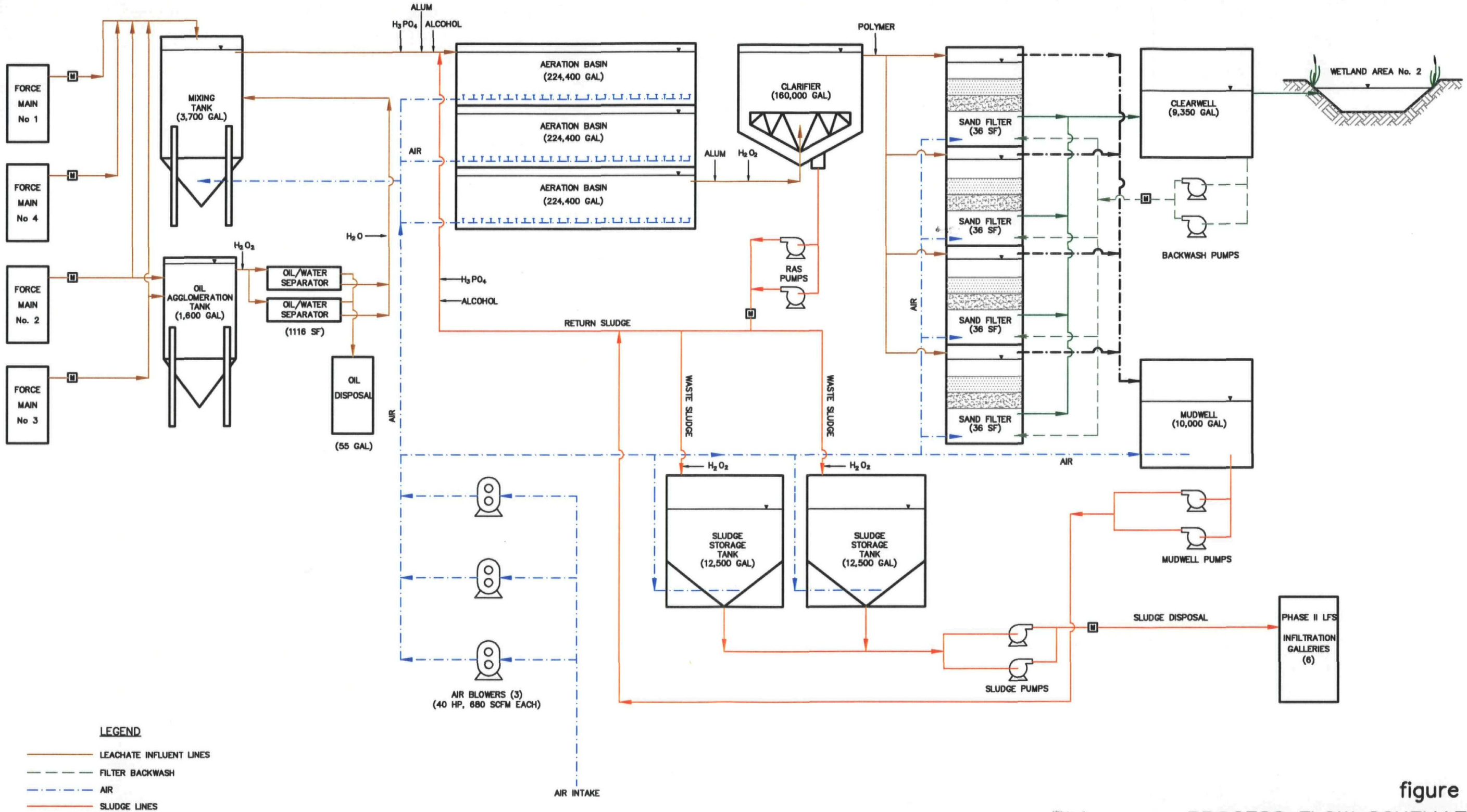


figure 3

PROCESS FLOW SCHEMATIC
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE
Macomb County, Michigan

CRA

06967-21(017)GN-WA005 NOV 15/1999

figure 4A

VALVE IDENTIFICATION
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H Landfill Site, Macomb County, MI

CRA

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MUD WELL RETURN P2

SLUDGE WASTE P2

SCUM LINE P2

AIR SCOUR P2

CLARIFIER EFFLUENT P2

AERATION AIR P2

FILTER BED #1

FILTER BED #2

FILTER BED #3

FILTER BED #4

MUD WELL

OVERFLOW

OVERFLOW P2

SLUDGE STORAGE #1

SLUDGE STORAGE #2

MUDWELL PUMP #6

MUDWELL PUMP #7

SLUDGE HANDLING PUMP #30

SLUDGE HANDLING PUMP #31

SEAL LUBRICANT SOLENOID

TO SLUDGE DISPOSAL

BACKWASH PUMP #15

BACKWASH PUMP #16

EMERGENCY SOLENOID

BUILDING VENTILATION ALARMS

SF1

SF2

EF4

EF5

GAS DETECTION PANEL

PROCESS ALARMS

AUTO DIALER

SPARE

TRANSFER SWITCH

GENERATOR SET CONTROL PANEL

NORMAL POWER AVAILABLE

GENERATOR RUNNING

GENERATOR FAIL

FIRE ALARM PANEL

INTRUSION PANEL

HEAT

SMOKE

DOOR/WINDOW

DIESEL FUEL TANK

TURBIDIMETER 0 - 100 NTU

AIR DRIER

TO AUTOMATIC VALVES

AIR COMPRESSOR M9

DISCHARGE TO WETLANDS

CLEAR WELL

LEGEND

CV-323	CONTROL VALVE
LPA-7	LOW PRESSURE AIR SYSTEM VALVE
SP-16	SAMPLE PORT
SV-312	SOLENOID VALVE

CRA

06967-21(017)GN-WA004 NOV 15/1999

figure 4B

VALVE IDENTIFICATION
GROUNDWATER/LEACHATE TREATMENT FACILITY

G & H Landfill Site, Macomb County, MI

TABLE 4.1

SUMMARY OF MONITORING AND ALARM CONDITIONS
GROUNDWATER / LEACHATE TREATMENT FACILTY

G & H LANDFILL SITE

System	SCADA Display	SCADA Logging	Alarm Condition/Action
1. Collection System Pumps S-1 to S-10 and WW4	1. pump status (on/off/local/auto/fail) 2. run time, cycle counter 3. pressure switch status 4. instantaneous level (ft) 5. low level float switch status	1. instantaneous level (ft) 2. cycle total 3. failure occurrences 4. alarm occurrences	1. pump failure/issue non-critical process alarm 2. low level in collection sump/issue non-critical process alarm
2. Collection Systems Flow Meters • I (S-1, S-2 and S-3) • II (S-4 and S-5) • III (S-6, S-7, S-8, S-9 and S-10) • WW-4	1. instantaneous flow (gpm) 2. totalized flow (monthly) (gal.) 3. Combined instantaneous and totalized (yearly) flow (integrated from individual instantaneous and totalized flows) (gpm and 1,000 gal.)	1. instantaneous flow (gpm) 2. totalized flow (monthly) (gal.) 3. Combined instantaneous and totalized (yearly) flow (gpm and 1000 gal.)	NA
3. Mix Tank	1. instantaneous temperature (°F) 2. maximum and minimum temperature (with reset)	1. instantaneous temperature (°F)	NA
4. Aeration Basins	1. instantaneous dissolved oxygen (mg/L) 2. maximum and minimum dissolved oxygen (with reset) 3. instantaneous pH 4. maximum and minimum pH (with reset) 5. instantaneous temperature (°F) 6. maximum and minimum temperature (with reset)	1. instantaneous dissolved oxygen (mg/L) 2. instantaneous pH 3. instantaneous temperature (°F) 4. alarm occurrences	1. exceed high or low level set point for DO/issue non-critical process alarm 2. exceed high or low level set point for pH/issue non-critical process alarm 3. exceed high or low level set point for temperature/issue non-critical process alarm
5. Air Blowers	1. blower status (on/off/local/auto/fail) 2. run time, cycle counter 3. pressure switch status 4. instantaneous blower temperature (°F) 5. instantaneous motor temperature (°F) 6. lead blower (software selectable) 7. instantaneous flow (cfm)	1. instantaneous temperatures (°F) 2. instantaneous flow (cfm) 3. cycle total 4. failure occurrences 5. alarm occurrences	1. blower failure/issue non-critical process alarm 2. blower failure and backup not available/issue critical process alarm 3. exceed high set point for temperature/issue non-critical process alarm

TABLE 4.1

SUMMARY OF MONITORING AND ALARM CONDITIONS
GROUNDWATER / LEACHATE TREATMENT FACILTY

G & H LANDFILL SITE

System	SCADA Display	SCADA Logging	Alarm Condition/Action
6. Clarifier	1. rake mechanism status (on/off/fail) 2. high torque switch status 3. high - high torque switch status 4. instantaneous turbidity (NTU) 5. high and high-high turbidity set points/ alarm status	1. instantaneous turbidity (NTU) 2. failure occurrences 3. alarm occurrences	1. rake mechanism failure/issue critical process alarm 2. high torque switch activated/issue non-critical process alarm 3. exceed high set point for turbidity/ issue non-critical process alarm 4. exceed high-high setpoint for turbidity/issue critical process alarm
7. Return Activated Sludge Pumps	1. pump status (on/off/local/auto/fail) 2. run time, cycle counter 3. lead pump (software selectable) 4. % of full speed	1. % of full speed 2. cycle total 3. failure occurrences 4. alarm occurrences	1. pump failure/issue non-critical process alarm 2. pump failure and backup not available/issue critical process alarm
8. RAS Flow Meter	1. instantaneous flow (gpm)	1. instantaneous flow (gpm)	NA
9. Sludge Wasting Cycle	1. sludge wasting valves status (open/ closed/fail) 2. sludge return valve status (open/ closed/fail) 3. sludge wasting valves operation: - duration in minutes and seconds (software selectable) - interval in hours (software selectable)	1. duration (in minutes and seconds) of sludge wasting 2. interval (in hours) of sludge wasting 3. failure occurrences 4. alarm occurrences	1. sludge wasting valves fail to open fully/issue non-critical process alarm 2. sludge return valve fails to close/ issue non-critical process alarm 3. sludge return valve fails to open upon completion of sludge wasting cycle/ issue critical process alarm 4. sludge wasting valves fail to close upon completion of sludge wasting cycle/issue critical process alarm 5. both sludge storage tanks fail/issue non-critical process alarm
10. Sludge Storage Tanks	1. tank status (on/off) 2. instantaneous level (ft) 3. high level alarm status 4. sludge outlet valve status (open/closed/fail)	1. high level alarm occurrence	1. high level in sludge storage tanks/ issue non-critical process alarm

TABLE 4.1

SUMMARY OF MONITORING AND ALARM CONDITIONS
GROUNDWATER / LEACHATE TREATMENT FACILTY

G & H LANDFILL SITE

System	SCADA Display	SCADA Logging	Alarm Condition/Action
11. Sludge Handling Pumps	1. pump status (on/off/local/auto/fail) 2. run time, cycle counter 3. % of full speed 4. pump operation - duration in minutes (software selectable) - interval in hours (software selectable) - rest period in days (software selectable) 5. lead pump (software selectable) 6. pump speed preset (software selectable)	1. duration (in minutes) of pump operation 2. interval (in hours) of pump operation 3. rest period (in days) between pump operation 4. cycle total 5. failure occurrences 6. alarm occurrences	1. pump failure/issue non-critical process alarm 2. pump failure and backup not available/issue critical process alarm
12. Sludge Disposal Flow Meter	1. instantaneous flow (gpm) 2. totalized flow (integrated from instantaneous flows) (gal.)	1. instantaneous flow (gpm) 2. totalized flow (gal.)	NA
13. Dual Media Filters	1. inlet valves status (open/closed/fail) 2. outlet valves status (open/closed/fail) 3. air scour valves status (open/closed/fail) 4. backwash valves status (open/closed/fail) 5. filter cell status (filtering/waiting/backwash/air scouring/disabled) 6. backwash counter 7. instantaneous air scour flow rate (cfm) 8. instantaneous turbidity (NTU) 9. high and high-high turbidity set points (software selectable)/alarm status 10. duration between timed backwashes (software adjustable) 11. high level alarm status 12. low level alarm status	1. backwash events 2. failure occurrences 3. alarm occurrences	1. inlet valve failure/issue non-critical process alarm 2. outlet valve failure/issue non-critical process alarm 3. air scour valve failure/issue non-critical process alarm 4. backwash valve failure/issue non-critical process alarm 5. low air scour rate/issue non-critical process alarm 6. exceed high and high-high turbidity set points/issue non-critical process alarm
14. Scum Storage Tank	1. high level alarm status	1. high level alarm occurrences	1. high level in scum tank/issue non-critical process alarm

TABLE 4.1

SUMMARY OF MONITORING AND ALARM CONDITIONS
GROUNDWATER / LEACHATE TREATMENT FACILTY

G & H LANDFILL SITE

System	SCADA Display	SCADA Logging	Alarm Condition/Action
15. Scum Pump	1. pump status (on/off/local/auto/fail) 2. run time, cycle counter	1. cycle total 2. failure occurrences 3. alarm occurrences	1. pump failure/issue non-critical process alarm
16. Backwash Pumps	1. pump status (on/off/local/auto/fail) 2. run time, cycle counter 3. pressure switch status 4. instantaneous flow (gpm)	1. cycle total 2. failure occurrences 3. alarm occurrences	1. pump failure/issue non-critical process alarm 2. pump failure and backup not available/issue critical process alarm
17. Mudwell	1. instantaneous level (ft) 2. high level alarm status 3. mudwell pump start/stop levels (software selectable)	1. high level alarm occurrences	1. high level in mudwell/issue non-critical process alarm
18. Mudwell Pumps	1. pump status (on/off/local/auto/fail) 2. run time, cycle counter 3. flow switch status	1. cycle total 2. failure occurrences 3. alarm occurrences	1. pump failure/issue non-critical process alarm 2. pump failure and backup not available/issue critical process alarm
19. Clearwell	1. instantaneous level (ft) 2. high-high level alarm status 3. low level alarm status	1. high level alarm occurrences 2. low level alarm occurrences	1. high level in clearwell/issue non-critical process alarm 2. low level in clear well/issue non-critical process alarm
20. Chemical Feed Pumps	1. pump status (on/off/fail) 2. feed pump flow rate (%)	1. failure occurrences 2. critical process alarm	1. pump failure/issue critical process alarm
21. Building Ventilation (SF1, SF2, EF4, EF5)	1. fan status (fail)	1. failure occurrences	1. fan failure/issue non-critical process alarm
22. Gas Detection Panel	1. alarm condition status	1. alarm occurrences	1. high gas level detected/issue discrete high level gas alarm
23. Fire Alarm Panel	1. alarm condition status	1. alarm occurrences	1. heat/smoke detector activated/issue discrete fire alarm

TABLE 4.1

SUMMARY OF MONITORING AND ALARM CONDITIONS
GROUNDWATER / LEACHATE TREATMENT FACILTY

G & H LANDFILL SITE

System	SCADA Display	SCADA Logging	Alarm Condition/Action
24. Intrusion Panel	1. alarm condition status	1. alarm occurrences	1. intrusion contact activated/issue discrete intrusion alarm
25. Building Temperature	1. high temperature switch status 2. low temperature switch status	1. alarm occurrences	1. high building temperature/issue discrete high building temperature alarm 2. low building temperature/issue discrete low building temperature alarm
26. Building Sump	1. high level alarm status	1. high level alarm occurrences	1. high level in building sump/issue critical process alarm
27. Air Compressor	1. pressure switch status	1. alarm occurrences	1. low air pressure/issue critical process alarm
28. Potable Water System	1. pressure switch status	1. alarm occurrences	1. low air pressure/issue non-critical process alarm
29. Non-potable Water System	1. pressure switch status	1. alarm occurrences	1. low air pressure/issue critical process alarm
30. Generator Set	1. generator set status (run/fail)	1. alarm occurrences	1. generator failure/issue critical process alarm
31. Transfer Switch	1. normal power available status	NA	NA
32. Diesel Fuel Tank	1. fuel level status	1. alarm occurrences	1. low fuel/issue critical process alarm

Note:

NA - Not applicable

TABLE 4.2

AUTODIALER ALARM RESPONSE PROCEDURES
G & H LANDFILL SITE
MACOMB COUNTY, MICHIGAN

Autodialer Alarm		*Recommended Response Procedure*
Process Alarms		
1.	Non-Critical Process alarm	Investigate and correct as part of regularly scheduled O&M activities.
2.	Critical process alarm	i) acknowledge autodialer alarm call; ii) access SCADA computer system via pcANYWHERE™ and determine cause of critical alarm; iii) correct alarm condition, if possible, via pcANYWHERE™ and push alarm reset button; and iv) if unable to correct alarm condition via pcANYWHERE™, physical attendance at the facility by the Operator will be required.
Facility Alarms		
3.	Combustible gas alarm	i) acknowledge autodilaer alarm call; ii) access SCADA computer system via pcANYWHERE™ and verify combustible gas alarm is active on Utilities screen; iii) determine if any supply or exhaust fans have faulted as indicated on the Utilities screen; iv) open air solenoid valves to both sludge tanks remotely via the Sludge Storage System screen. Monitor for one hour while ventilation system ventilates building; v) if combustible gas alarm has not cleared after one hour of active ventilation, physical response to alarm condition by the Operator will be required; and vi) using a combustible gas meter, check for combustible gas readings at the sludge tank vents and at each facility door entrance prior to entry. If combustible gas is detected, allow building to continue to ventilate prior to entry. If combustible gas is not detected, enter building with combustible gas meter and investigate cause of alarm condition (possible false readings).

TABLE 4.2

AUTODIALER ALARM RESPONSE PROCEDURES
G & H LANDFILL SITE
MACOMB COUNTY, MICHIGAN

Autodialer Alarm		*Recommended Response Procedure*
4. Building low temperature alarm	i)	acknowledge autodialer alarm call;
	ii)	access SCADA computer system via pcANYWHERE™ and verify low temperature alarm is active on Utilities screen; and
	iii)	temperature alarm is activated upon building reaching 40°F and physical attendance at the facility by the Operator will be required to verify/repair building heating system operation.
5. Building high temperature alarm	i)	acknowledge autodialer alarm call;
	ii)	access SCADA computer system via pcANYWHERE™ and verify high temperature alarm is active on Utilities screen;
	iii)	check if supply and exhaust fans have faulted as indicated on the Utilities screen; and
	iv)	high temperature alarm is activated upon building reaching 100°F and physical attendance at the facility by the Operator will be required to verify/repair building ventilation system operation.
6. Fire Alarm	i)	acknowledge autodialer alarm call;
	ii)	access SCADA computer system via pcANYWHERE™ and verify fire alarm is active on Utilities screen; and
	iii)	upon verification, call the fire department to respond. Operator personnel should also respond to assist fire department.
7. Intrusion alarm	i)	acknowledge autodialer alarm call;
	ii)	access SCADA computer system via pcANYWHERE™ and verify intrusion alarm is active on Utilities screen;
	iii)	review Alarm screen to determine if intrusion alarm associated with power failure (possible false alarm); and
	iv)	upon verification, call the police department to respond. Operator personnel should also respond to assist the police department (Operator personnel should not respond to intrusion alarm alone.)

TABLE 5.1

EQUPMENT MAINTENANCE SCHEDULE
GRONDWATER / LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Item	*Maintenance Frequency*	*Maintenance Description*
Facility Walkthrough	Weekly	note irregularities in any equipment or operation, log unusual or suspicious operation, order any spare parts if required
Inspect Packings and Seals	Weekly	inspect pump packings, mechanical seals and external seal/packing flushing lines
Chemical System	Weekly	inspect for correct operation and calibration, ensure pump suction lines are free of air, chemical is available, and all feed lines and connections are free of leaks
Level Check	Weekly	visual check on clarifier and aeration basin level
Filter Backwash	Weekly	visually inspect for correct operation, check air scour flow rate and backwash flow rate, ensure no media is being washed into backwash trough
SCADA Display	Weekly	verify visual reading with that displayed on SCADA display, calibrate equipment if discrepancies, record date and time of calibration
Turbidimeters	Weekly	clean instruments
Pumps with packing and mechanical seals	Monthly	check for excessive noise or unusual condition, adjust packings if leakage is excessive, check all lubrication water lines
Starter Control Panel	Monthly	check indicator lights, phase voltage and amperages and note any unusual readings or imbalance with normal operation
Air Filters	Monthly	check and service
Standby Generator	Monthly	check oil, radiator, fuel and battery level and charging system
Valves	Monthly	exercise valves that are not used regularly

TABLE 5.1

EQUPMENT MAINTENANCE SCHEDULE
GRONDWATER / LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Item	*Maintenance Frequency*	*Maintenance Description*
Ground fault receptacles/breakers	Monthly	ensure proper operation
Emergency Lighting System	Monthly	ensure proper operation
Inventory	Monthly	update and replace all spare parts, disposables, chemical inventory
Fire Extinguishers	Monthly	check for full charge and pressure
Electric Heater Units and Fans	Quarterly	check and clean
Clarifier Weir Trough	Quarterly	check and clean
Air filter for blowers	Quarterly	check and clean/replace
Standby Equipment	Quarterly	adjust alternation of standby equipment
Instrumentation	Quarterly	calibrate all instrumentation to standards
Equipment Maintenance	Quarterly	as recommended by manufacturer
Tertiary Filters	Quarterly	check headlosses after a backwash and compare to normal values
Electrical System	Yearly	check motor starters, fusible and non-fusible disconnects, breakers, ground fault receptacles, electrical connections, motor phases for amperage, and megger all critical circuits
Tanks	5 Years	drain oil water separators, oil agglomeration tank, mix tank, aeration basins, clarifier, filters and clean and inspect concrete structures and mechanical parts, make any repairs where necessary

TABLE 5.2

INSTRUMENT CALIBRATION SCHEDULE
GROUNDWATER / LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Item		*Maintenance Frequency*	*Maintenance Description*
1.	Temperature and pH Sensors MP63	Quarterly	Calibration (Volume III)
2.	Dissolved Oxygen Sensors D63/5440	Quarterly	Calibration (Volume III)
3.	Low Range Turbidimeter M1720C	Quarterly	Calibration (Volume III)
4.	Surface Scatter Turbidimeter MSS6	Quarterly	Calibration (Volume III)
5.	Air Mass Flow Meter AF Series	Annually	Calibration (Volume III)
6.	Ultrasonic Level Sensor	Annually	Calibration (Volume III)
7.	Flow Meters	Annually	Calibration (Volume III)
8.	Combustible Gas Detection System	Annually	Calibration (Volume III)

TABLE 6.1

TROUBLESHOOTING
GROUNDWATER/LEACHATE TREATMENT FACILITY
G&H LANDFILL SITE

Problem	*Potential Sources of Problems*	*Solution*
Groundwater/Leachate Collection Systems		
1. Reduced flow to treatment facility	- pump problem	- inspect, repair (or replace)
	- line leak	- test lines and repair
	- line plugged	- test lines and clear
	- meter malfunction	- test meter and repair
	- PLC malfunction	- reset PLC, call for programming assistance
	- transducer malfunction	- test and repair
2. Increased flow to treatment facility	- meter malfunction	- test meter and repair
	- PLC malfunction	- reset PLC, call for programming assistance
	- transducer malfunction	- test and repair
Primary Treatment Process		
1. Oil removal problem	- oil reservoir full	- empty oil reservoir
	- chemical feed malfunction	- inspect and repair
	- accumulation of oil in tanks	- remove oil from tanks
Aeration System		
1. Air Volume too low/DO level too low	- valve settings incorrect	- verify valve setting and adjust
	- blower system plugged	- inspect filters and clean (replace if necessary)
		- verify valve setting and adjust
	- DO analyzer malfunction	- find plug and clean
	- PLC malfunction	- inspect, repair (or replace)
		- reset PLC, call for programming assistance
2. Air Volume too high/DO level too high	- valve settings incorrect	- verify valve settings and adjust
	- DO analyzer malfunction	- inspect, repair (or replace)
	- PLC malfunction	- reset PLC, call for programming assistance

TABLE 6.1

TROUBLESHOOTING
GROUNDWATER/LEACHATE TREATMENT FACILITY
G&H LANDFILL SITE

Problem	*Potential Sources of Problems*	*Solution*
Clarifier		
1. Sludge buildup	- RAS pump malfunction	- inspect RAS pumps and repair (or replace)
	- plug in line	- find plug and clean
2. Scum buildup	- scum pump malfunction	- inspect pump and repair (or replace)
	- plug in line	- find plug and clean
Tertiary Filters		
1. Drop in flow rate	- filter backwash malfunction	- check valves, pump operation and repair
	- PLC malfunction	- reset PLC, call for programming assistance
2. Increase in turbidity in effluent	- bridging of filter media	- drain filter cell and inspect media (or replace)
	- loss of filter media	
	- turbidity meter malfunction	- inspect, repair (or replace)
Sludge Disposal System		
1. Drop in sludge disposal rate	- infiltration gallery blocked	- switch to other infiltration gallery
	- sludge pump malfunction	- inspect, repair (or replace)
	- plug in line	- find plug and clean
Outfall System		
1. Backup of effluent in outfall line	- outfall plugged	- find plug and clean

APPENDIX A

SCOPE OF WORK (CONSENT DECREE)

Scope of Work for the Remedial Design and Remedial Action at the G&H Industrial Landfill Site, Macomb County, Michigan.

I. PURPOSE

The purpose of the Scope of Work is to implement the G&H Industrial Landfill Site (the "Site") Record of Decision ("ROD"), which the United States Environmental Protection Agency ("EPA") issued in December, 1990 to select the remedial action for the Site. EPA Superfund Remedial Design and Remedial Action Guidance; the Record of Decision, as modified by an ESD or as amended pursuant to Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986, Pub. L. 99-499 ("CERCLA"); the approved Remedial Design and Remedial Action ("RD/RA") Work Plan; any additional guidance document(s) provided by EPA; and the provisions of the Consent Decree and this Scope of Work ("SOW") shall be followed in designing and implementing the remedial action at the Site.

II. DESCRIPTION OF THE REMEDIAL ACTION

Settling Defendants shall achieve the following standards and specifications of the major components of the remedial action for the Site:

A. Landfill Cap

Settling Defendants shall design, construct, and maintain a landfill cover ("cap") that meets or exceeds the requirements of Michigan State Hazardous Waste Rules 299.9619 and RCRA Subtitle C (landfill closure under 40 C.F.R. Section 264.310) as enforced by Michigan Act 64. At a minimum, the cap shall be a multilayer cap as described below (from top to bottom):

1. A vegetative topsoil layer which is a minimum 6 inches thick that will sustain plant growth (e.g., prairie grass) and will control erosion and promote drainage;

2. A common fill soil layer which is a minimum 2.0 feet thick, unless EPA, in consultation with MDNR, determines that a lesser amount of common fill soil would maintain the hydraulic conductivity of the entire clay layer at 1×10^{-7} centimeters per second ("cm/s") in which case a minimum of 1.0 foot of common fill soil may be utilized;

3. A sand/gravel drainage layer which is a minimum 1.0 foot thick that will minimize precipitation infiltration into the low permeability layer. The sand/gravel drainage layer shall have a minimum hydraulic conductivity of 1×10^{-3} cm/s;

4. A low permeability, compacted clay layer that minimizes precipitation infiltration into the landfill. The clay layer shall be a minimum 3.0 feet thick and have a maximum hydraulic conductivity of 1 x 10^{-7} cm/s; and

5. A gas venting system capable of removing methane gas build-up beneath the cover, and installed in a manner which does not increase the hydraulic conductivity of the cap above 1 x 10^{-7} cm/s. Gas venting shall comply with the substantive requirements of an air quality permit under Michigan Act 348, as approved by EPA, in consultation with MDNR.

Settling Defendants shall install the cap over the landfill areas as designated in Figure 1. Sufficient fill material shall be placed under the cap to bring the landfill areas up to the correct grades (minimum of 2%), as shown in Figure 2. Fill material may be comprised of excavated soils or sediments from the polychlorinated biphenyls ("PCBs") area of concern (see Section II.D, below); excavated soils, if any, from the automobile disposal yard (see Section II.C, below); clean soils; non-hazardous demolition rubble; fill from the wetlands replacement area; and clean construction-site soils. Settling Defendants shall demolish existing structures on the landfill property along 23-Mile Road by July 15, 1992.

No multilayer cap shall be placed over the Detroit Water and Sewerage Department ("DWSD") easement as shown in Figure 1 unless EPA, in consultation with MDNR, determines that it is necessary from an engineering perspective for the maintenance of the correct grade. Should the DWSD need to excavate in the easement for any reason, Settling Defendants shall be responsible for the subsequent repair of cap damage. Settling Defendants shall contact the DWSD and arrange for a formal agreement regarding access, cap placement, and excavation and repair procedures. Settling Defendants shall submit a copy of the formal arrangement to EPA within 15 days of its execution. If the EPA, in consultation with MDNR, determines that it is necessary to place fill in the easement area, then Settling Defendants shall place clean fill in that area.

Earthen berms and/or plant materials (i.e., trees or shrubs) shall be placed around the landfill area perimeter to control dust and noise impacts. Other adequate noise and dust suppressant measures shall be taken to protect the community from the effects of construction.

After construction of the cap, the vegetative, drainage, and clay layers shall be maintained by Settling Defendants. Maintenance concerning the cap shall include grass maintenance, regular inspections, flushing drainage lines, and repair of damaged areas, including frost damage, in accordance with the requirements of the Operations and Maintenance Plan (see Section III, Task 2, below).

B. Source Containment System

Settling Defendants shall design, construct, and operate and maintain a source containment system which shall hydraulically and physically isolate the Phase I, II, and III landfill areas, the oil seep area, and, if necessary as determined under Section II.C. of this SOW, the automobile disposal yard. The source containment system shall prevent the further migration of hazardous substances, pollutants, and contaminants from the Site and assure that groundwater outside of the source containment system at the Site shall achieve each of the Cleanup Standards set forth in Table 1 (see Section II.E., below) at the conclusion of the Work[1].

Settling Defendants shall construct the source containment system comprised of one of the following components:

1a. A gravel-filled groundwater collection trench which shall be constructed with a minimum of six collection sumps; perforated collection tile; a series of piezometers upgradient of the trench; and a downgradient barrier consisting of either a minimum 2.0 foot thick slurry wall with a maximum hydraulic conductivity of 1×10^{-7} cm/s or a Flexible Membrane Liner (FML) as approved by EPA, in consultation with MDNR. The downgradient barrier shall be keyed into the lacustrine/till unit beneath the Site, with a minimum of 3.0 feet of the slurry wall to be constructed into the lacustrine/till unit; or

1b. A subsurface vertical barrier wall ("slurry wall") which shall be constructed along the southern perimeter of the Phase I and II landfill areas, and the oil seep area. The slurry wall shall be a minimum 2.0 feet thick and have a maximum hydraulic conductivity of 1×10^{-7} cm/s. The slurry wall shall be keyed into the lacustrine/till unit beneath the Site, with a minimum of 3.0 feet of the slurry wall to be constructed into the lacustrine/till unit;

Implementation of either the groundwater collection trench or the slurry wall shall be subject to approval by EPA, in consultation with MDNR.

In addition to component 1a or 1b above, Settling Defendants shall construct the source containment system with each of the following components:

2. A minimum of one extraction well located in the DWSD easement to prevent any length of the watermain from being in contact with

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[1]As used in this SOW, the term "Work" shall have the same meaning as in Section IV of the Consent Decree.

the groundwater table and to intercept landfill contaminants which may migrate in the bedding material for the watermain;

3. A subsurface vertical barrier wall (slurry wall) located along the southeast side of the Phase I landfill area to prevent migration of contaminants from the landfill. The slurry wall shall be keyed into the lacustrine/till unit beneath the Site, with a minimum of 3.0 feet of the slurry wall to be constructed into the lacustrine/till unit. The lateral extent of the slurry wall may be modified as required in Section II.C., below; and

4. A leachate collection toe drain located on the western side of the Phase III landfill area.

Figure 3a indicates the alignment of the groundwater collection trench, the downgradient barrier (i.e., slurry wall or FML), the toe drain, and the location of the DWSD extraction well. Figure 3b indicates the alignment of the slurry wall and the toe drain, and the location of the DWSD extraction well.

Groundwater and leachate intercepted by the source containment system shall be pumped to the treatment system (see Section II.E, below) for removal of chemicals to the extent necessary to satisfy water discharge criteria as required in Sections II.E.3 and II.E.4, below.

Settling Defendants shall construct the source containment system comprising of one of the following components:

1a. Groundwater Collection Trench

Settling Defendants shall install the groundwater collection trench by excavating to the top of the lacustrine clay/till unit along the alignment shown in Figure 3a. Perforated collection tile shall be placed at the base of the trench and the tile shall be surrounded by clean, coarse gravel backfill. The remainder of the trench also shall be backfilled with clean, coarse gravel. The upgradient side of the trench shall be designed so that the trench width, the size and gradation of gravel, and any other construction materials will prevent siltation of the gravel.

Settling Defendants shall construct a minimum 2.0 foot thick barrier (slurry wall) with a maximum hydraulic conductivity of 1×10^{-7} cm/s, or an FML, downgradient of the trench ("downgradient barrier") to prevent the dewatering of the aquifer and wetlands area to the south of the trench alignment. The downgradient barrier shall be keyed into the lacustrine/till unit beneath the Site, with a minimum of 3.0 feet of the slurry wall to be constructed into the lacustrine/till unit. Material with a lower permeability than the gravel backfill (e.g., clay or silt) shall be used to backfill the surface of the trench to reduce surface run-

off infiltration into the trench and also to reduce air emissions from the trench.

Settling Defendants shall install a minimum of six collection sumps to remove collected water to provide an inward 2.0-foot hydraulic gradient across the trench (i.e., the hydraulic head of the water table outside of the downgradient barrier shall be a minimum 2.0 feet higher than the hydraulic head of the water table on the inside of the downgradient barrier). At a minimum, groundwater shall be removed from the collection trench to produce hydraulic containment of the Site in the area shown in Figure 4a. Hydraulic containment is defined as the condition where the upper aquifer groundwater gradients cause flow towards the groundwater collection trench from the areas of the Site designated in Figure 4a. Settling Defendants shall install piezometers upgradient of the source containment system. Settling Defendants shall monitor the piezometers every 2 months, at a minimum, to demonstrate that water removal has achieved hydraulic containment. If water level measurements demonstrate that hydraulic containment is not occurring, then pumping rates shall be increased as necessary to accomplish hydraulic containment (see Section II.B.7, below).

Settling Defendants shall remove collected water from the trench by pumping the six sumps. The sumps shall be installed in such a manner as to ensure that a blockage in the system shall not isolate any part of the system and cause any part of the system to be inoperable. Should blockage occur, repair shall proceed as set forth in Section II.B.7, below. Settling Defendants shall provide a backup power source to ensure that the source containment system shall operate during power outages.

Settling Defendants shall design, construct, operate and maintain the groundwater collection trench to collect and remove nonaqueous or separate phase products (e.g., oil, paints, solvents) derived from the Site. The collected separate phase products shall be properly removed for treatment off-site in accordance with the Resource Conservation and Recovery Act of 1980 (RCRA), 42 U.S.C. §6901 et seq., and PCB-specific requirements of the Toxic Substances Control Act (TSCA), 15 U.SC. §2601, et. seq. The downgradient barrier shall be compatible with any separate phase products to provide a barrier to migration while removal of the separate phase products is on-going.

1b. Slurry Wall

Settling Defendants shall design, construct, and maintain a subsurface vertical barrier wall ("slurry wall") along the southern perimeter of the Phase I and II landfill areas and the oil seep area, as designated in Figure 3b. The slurry wall shall be a minimum 2.0 feet thick and have a maximum hydraulic conductivity of 1×10^{-7} cm/s. The slurry wall shall be keyed into the lacustrine-

till unit beneath the Site, with a minimum of 3.0 feet of the slurry wall to be constructed into the lacustrine/till unit.

Settling Defendants shall design, construct, operate and maintain a groundwater gradient control network to provide an inward 2.0-foot hydraulic gradient across the slurry wall (i.e., the hydraulic head of the water table outside of the slurry wall shall be a minimum 2.0 feet higher than the hydraulic head of the water table on the inside of the slurry wall). At a minimum, groundwater shall be removed from the landfill area to produce hydraulic containment of the Site in the area shown in Figure 4b. Hydraulic containment is defined as the condition where the upper aquifer groundwater gradients cause flow towards the slurry wall from the areas of the Site designated in Figure 4b. Settling Defendants shall install piezometers upgradient of the source containment system. Settling Defendants shall monitor the piezometers every 2 months, at a minimum, to demonstrate that water removal has achieved hydraulic containment. If water level measurements demonstrate that hydraulic containment is not occurring, Settling Defendants shall increase pumping rates as necessary to accomplish hydraulic containment (see also Section II.B.7, below). Settling Defendants shall design the extraction well system so that pumping rates of individual pumps may be adjusted should maintenance be required on adjacent pump(s).

Settling Defendants shall treat contaminated groundwater that is extracted to meet National Pollutant Discharge Elimination System ("NPDES") criteria, as described in Sections II.E.3 and E.4, below, prior to its discharge to the wetlands or the Clinton River; or if discharge is made to the DWSD treatment system, pretreatment requirements must be met. The estimated extraction well placement is shown in Figure 3b. The final extraction well network will be determined after the slurry wall and landfill cover have been installed. The final determination shall be based upon Site conditions such as the local geology or debris at the designated well points in Figure 3b and the amounts of water that must be removed to maintain the 2-foot head differential. Water treatment residuals shall be handled as described in Sections II.E.3 and II.J, below.

Maintenance of the slurry wall may entail the extraction of oil from the Phase I landfill area (Figure 3b) to prevent the adverse effects that the oil may have on the slurry wall materials. Settling Defendants shall design and, upon EPA approval, shall implement, compatibility testing of the slurry wall construction materials with chemical compounds associated with the landfill. Compatibility testing shall evaluate the effects of varied concentrations of typical landfill contaminants (e.g., oil), up to the maximum concentrations noted in the RI report, on the effectiveness of the slurry wall construction materials. Test results shall be submitted to EPA for review. If EPA, in consultation with MDNR, determines that high concentrations of

hazardous substances are likely to increase the hydraulic conductivity of the slurry wall to greater than 1 x 10^{-7} cm/s, then Settling Defendants shall utilize oil/water extraction wells to prevent the migration of oil and solvents towards the slurry wall. Extracted oil/water shall be treated as in Section II.E.3, below.

In addition to component 1a or 1b, above, the source containment system constructed by Settling Defendants shall include each of the following components:

2. Extraction Well in DWSD Easement

A minimum of one extraction well(s) shall be located in the DWSD easement upgradient of the collection trench (1a) or slurry wall (1b). The well(s) shall be operated and maintained to continuously prevent the groundwater table or landfill contaminants from contacting the watermain.

3. Slurry Wall

Settling Defendants shall design, construct, and maintain a slurry wall along the southeast perimeter of the Phase I landfill area as shown in Figure 3a or 3b. The slurry wall shall be a minimum of 2.0 feet thick and have a maximum hydraulic conductivity of 1 x 10^{-7} cm/s. The slurry wall shall be keyed into the lacustrine/till unit beneath the site, with a minimum of 3.0 feet of the slurry wall to be constructed into the lacustrine/till unit. The slurry wall shall be connected to the downgradient barrier.

Maintenance of the slurry wall may entail the extraction of separate phase products from the Phase I landfill area to prevent the products from increasing the hydraulic conductivity of the slurry wall to greater than 1 x 10^{-7} cm/s. Settling Defendants shall design and, upon EPA approval, implement compatibility testing of the slurry wall construction materials with chemical compounds associated with the landfill. Testing shall evaluate the effects of concentrations of the landfill contaminants (e.g., oil) noted in the RI report (Table 3-3), on the effectiveness of the slurry wall construction materials. Compatibility test results shall be submitted to EPA for review. If EPA, in consultation with MDNR, determines that high concentrations of hazardous substances are likely to increase the hydraulic conductivity of the slurry wall to greater than 1 x 10^{-7} cm/s, then Settling Defendants shall utilize oil/water extraction wells to prevent the migration of oil and solvents towards the slurry wall. Extracted oil/water shall be treated as in Section II.E.3, below.

4. Leachate Collection Drain

Settling Defendants shall design, construct, operate, and maintain a leachate collection toe drain along the west side of the Phase

III landfill area. The leachate collection drain shall be located as shown in Figure 3a or 3b.

The leachate collection drain shall consist of a 6-inch diameter perforated PVC pipe with 4-inch perforated PVC pipe lateral connections which shall extend upward into the bank of waste. The perforated pipe shall be wrapped in filter cloth to prevent plugging of the perforations and shall be installed in trenches which shall be backfilled with coarse granular material to provide additional drainage.

The system shall drain via gravity flow to a collection sump located southwest of the Phase III landfill area. A sump pump shall be used to transfer the collected leachate via forcemain to the on-site treatment plant (see Section II.E, below). A back-up power source shall be installed in case of general power failure.

5. Operational Time Period

Settling Defendants shall continuously operate and maintain each component of the source containment system.

6. Demonstration of Performance

Within 60 days after start-up of the sumps, Settling Defendants shall demonstrate that the source containment system is meeting the performance criteria identified in the approved Final RD/RA Design document.

7. Correction of Deficiencies

Should groundwater level measurements show that the source containment system is not maintaining hydraulic and/or physical containment of the Site, EPA, in consultation with MDNR, shall request Settling Defendants to provide a plan for corrective action. Settling Defendants, within 20 days of receipt of the request, shall submit a corrective action plan to EPA for review and approval. The corrective action plan shall include a schedule for any investigative or construction work necessary to correct any deficiencies noted. If EPA does not approve the corrective action plan, EPA shall provide comments to Settling Defendants who shall resubmit the plan within 10 days of receipt of comments. Upon approval of the corrective action plan, Settling Defendants shall implement the plan in accordance with the schedule set forth in the approved plan.

C. Junkyard

Settling Defendants shall design and implement a soil sampling and analysis program for the automobile disposal yard ("junkyard") located at 23-Mile and Ryan Roads (see Figure 5). The information gathered shall be used during the design of the landfill cap to

determine if the soil and any remaining surface debris at the junkyard are contaminated.

The sampling and analysis program for the junkyard shall include, but not be limited to, the delineation of the extent of the landfill into the junkyard and sampling and analysis of soil to determine whether or not unacceptable risks may be posed. A minimum of 15 locations shall be sampled and analyzed to optimize any required treatment and/or disposal operations and systems. Settling Defendants shall submit to EPA and MDNR a Junkyard Sampling Plan ("JSP") for the junkyard soil sampling and analysis program by July 15, 1992. Settling Defendants shall complete the sampling of the junkyard area within 60 days of EPA's approval of the JSP.

Settling Defendants shall submit all information gathered to EPA during the preliminary (30%) design submittal. EPA shall determine, in consultation with MDNR, whether conditions warrant either no action, or the removal and/or the capping of the surface soils and debris at the junkyard. EPA shall consider, but not be limited to, the following factors to determine whether the soil and debris shall be removed or capped:

a. Contaminant types and concentrations present in the soil and surface debris;

b. Volume of affected soil and debris;

c. Short-term impacts of excavation of the soil and debris on site workers and the community; and

d. If greater than a 1×10^{-6} excess cancer risk and/or greater than a 1.0 Hazard Index exists under standard risk assessment scenarios.

If EPA, in consultation with MDNR, determines that the soil and remaining surface debris in the junkyard are contaminated and that excavation may pose unacceptable short-term risks to site workers or to the community, then Settling Defendants shall design and construct a cap for the junkyard soils in accordance with the specifications in Section II.A, above. In addition, EPA, in consultation with MDNR, shall require the source containment system (Section II.B, above) to hydraulically and physically contain the junkyard area if EPA, in consultation with MDNR, determines that oil-saturated soil/debris extends into the junkyard portion of the property.

Settling Defendants shall design and implement the soil and debris remediation program in the junkyard upon EPA's determination, in consultation with MDNR, of the appropriate surface soil and debris remediation program. Cleanup standards to be applied to the

contaminant levels found shall be determined under Michigan Act 307, Type B criteria if the soil is to be excavated and consolidated under the landfill cap. Michigan Act 307, Type C criteria shall apply if it is determined that the junkyard area shall be hydraulically and physically contained and/or capped.

D. PCBs in Soils/Sediments

Settling Defendants shall design and implement a soil/sediment sampling program to fully delineate where soils and sediments at the Site, projected to be located outside of the areas to be capped, contain 1 mg/kg (ppm) or greater PCBs. Those soils and sediments containing 1 ppm or greater PCBs and which are potentially located outside of the areas to be capped shall be fully identified for excavation and removal. The areas to be sampled are shown in Figure 6. Once the complete areas containing PCBs at 1 ppm or greater are determined by EPA, in consultation with MDNR, Settling Defendants shall design and implement a soil/sediment removal program at the Site, subject to the approval of EPA, in consultation with MDNR.

Soils/sediments containing 500 ppm PCBs or greater shall be excavated and treated as determined in Section III.K.6 of the ROD (page 44). Soils/sediments containing less than 500 ppm PCBs shall be consolidated under the Phase I landfill area cap. Excavations shall be refilled with clean soil.

E. Installation and Operation of a Groundwater Extraction, Collection, Treatment, and Discharge System

Settling Defendants shall design, construct, operate, maintain, and modify, as approved by EPA, an on-site groundwater extraction, collection, treatment, and discharge system ("groundwater extraction system") in a manner to capture, draw back, and remove the groundwater contaminant plume ("plume") located outside of the source containment system (see Figure 3). The groundwater extraction system shall prevent the further migration of hazardous substances, pollutants and contaminants in groundwater from the Site and assure that groundwater outside of the source containment system shall achieve each of the Cleanup Standards set forth in Table 1 at the conclusion of the Work.

The groundwater extraction system well network shall utilize a minimum of 20 extraction wells (see Figure 7 for approximate well locations) to achieve the groundwater Cleanup Standards, unless EPA determines, in its unreviewable discretion, that fewer extraction wells will achieve the cleanup objectives.

Settling Defendants shall perform a pump test prior to the design of the groundwater extraction system network to assist EPA, in consultation with MDNR, to determine the optimum pumping rate to extract the plume; however, at a minimum, the extraction wells

shall pump a total of 30 gallons per minute. Extraction wells also shall be pump tested during the installation phase to refine the design as required to capture and draw back the plume. Settling Defendants shall install piezometers downgradient of the extraction wells to verify that the capture zone(s) are as required to capture and draw back the plume and to prevent the further migration of contaminants from the Site.

The collection and distribution system shall be used to transport extracted groundwater to the treatment system for chemical removal (see Section II.E.3, below). The groundwater extraction system shall be designed to operate year-round.

EPA may require that the groundwater extraction system be modified in order to achieve the groundwater Cleanup Standards as follows:

(a) Pumping may be discontinued at individual wells where groundwater Cleanup Standards have been attained;

(b) Wells may be pumped on an alternate basis to eliminate stagnation points;

(c) "Pulse pumping" may be performed to allow the aquifer to equilibrate and allow adsorbed contaminants to partition into the groundwater for extraction; and

(d) Additional extraction wells may be installed to facilitate or accelerate cleanup of the contaminant plume.

1. Groundwater Cleanup Standards

The concentrations of any hazardous substances, pollutants and contaminants remaining in the upper aquifer located outside of the source containment system, at the time of issuance of the Certification of Completion of the Remedial Action pursuant to Section XXVII of the Consent Decree, shall not exceed any of the concentrations of hazardous substances, pollutants or contaminants in groundwater set forth in Table 1, subject to Section VI, Paragraph 11.b. of the Consent Decree ("Technical Impracticability") and Section II.G.5 ("Additional Information") of this SOW. The Cleanup Standards established in Table 1, subject to Section VI, Paragraph 11.b. of the Consent Decree and Section II.G.5 of this SOW, shall be achieved, and thereafter continuously maintained, at each of the extraction and monitor wells located outside of the source containment system at the Site.

Table 1

Groundwater Cleanup Standards
G&H Industrial Landfill

Compound	Standard
Benzene	1.0 ppb
Xylene	20 ppb
Ethylbenzene	30 ppb
Arsenic	0.02 ppb*
Lead	5 ppb*
Trichloroethene	3 ppb
Tetrachloroethene	1.0 ppb
cis-1,2-Dichloroethene	1.0 ppb
trans-1,2-Dichloroethene	100 ppb
Vinyl chloride	1.0 ppb
1,1-Dichloroethane	1.0 ppb

*Naturally occurring (background) levels found at the Site may be higher than the Cleanup Standard. In that event, background levels will become the Cleanup Standard.

2. Determination of Residual Risks

The following procedures shall be used to determine residual risks in any petitions submitted to EPA:

a. Determination of Groundwater Risks for Substances with Possible Carcinogenic Effects.

Settling Defendants shall calculate the excess lifetime carcinogenic risk associated with exposure to a hazardous substance, pollutant or contaminant that has been identified by EPA's Cancer Assessment Group as a possible, probable or known human carcinogen. Individual substance carcinogenic risk levels shall be calculated for each extraction and monitor well screened in the upper aquifer outside of the source containment system, in accordance with the Risk Assessment Guidance for Superfund Manual (December, 1989) or any successor document, or revisions thereto, in effect at the time the calculations are performed. The toxicity data used in preparing the calculations for each substance shall be the most current data contained in such Manual or available from EPA's Cancer Assessment Group with respect to that substance. All risk calculations shall reflect risks associated with ingestion-, dermal absorption-, and inhalation-specific exposure routes considered significant for groundwater and shall be based on the same exposure scenarios used in EPA's Remedial Investigation Public

Health Evaluation for the Site. Calculations shall be submitted to EPA for review and approval.

b. Determination of Groundwater Toxic Effects for Substances Not Believed to be Carcinogens.

Settling Defendants shall calculate the chronic Hazard Index associated with exposure to a hazardous substance, pollutant, or contaminant that has not been identified by EPA's Cancer Assessment Group as a possible, probable or known human carcinogen. The chronic Hazard Index shall be calculated for the groundwater at each extraction and monitor well screened in the upper aquifer outside of the source containment system. The chronic Hazard Index shall be calculated in accordance with the Risk Assessment Guidance for Superfund Manual (December, 1989) or any successor document, or revisions thereto, in effect at the time the calculations are performed and any other applicable EPA guidance. The toxicity data used in preparing the Hazard Index calculations for each substance shall be the most current data contained in such Manual or in other guidance issued by EPA. All Hazard Index calculations shall reflect risks associated with ingestion-, dermal absorption-, and inhalation-specific exposure routes considered significant for groundwater ingestion, dermal absorption, and inhalation of contaminants and shall be based on the same exposure scenarios used in EPA's Remedial Investigation Public Health Evaluation for the Site.

3. Treatment

Extracted groundwater shall be pumped to the treatment system for removal of chemical contaminants to the extent necessary to satisfy (a) NPDES discharge criteria prior to discharge of the treated water to the wetlands or the Clinton River; or (b) pretreatment requirements for discharge to the DWSD treatment system. The groundwater treatment process shall be capable of treating a minimum of 100 gallons per minute ("GPM") and shall include at least the following steps: oil and water separation, metals removal (e.g., precipitation, clarification, and filtration), and organic chemical removal (aeration and carbon polishing). Treatability testing shall be performed to determine the design parameters of the treatment system in order to meet direct discharge or pretreatment requirements. Emissions from the air stripper shall meet the substantive requirements of a Michigan Act 348 air permit.

All treatment process residuals shall be handled in accordance with all applicable or relevant and appropriate requirements pertaining to the Site. Spent carbon from water and/or air treatment systems shall be handled as a RCRA waste and either disposed of in a RCRA-compliant facility in accordance with Land Disposal Restrictions or regenerated off-site (see Section II.J, below). Recovered oils

shall be thermally destroyed off-site in a RCRA-compliant and, if the oil contains PCBs, TSCA-compliant facility.

The treatment system shall be located as close to the landfilled area of the Site as practicable and shall be situated to minimize interference with the reopening of the Rochester-Utica State Recreational Area.

4. Discharge

Any discharges to the wetlands or the Clinton River, or alternatively to the DWSD treatment plant, shall comply with all effluent limitations, monitoring requirements, reporting requirements, and other substantive requirements approved by EPA, in consultation with MDNR, including all such discharges from the treatment system or from the pump testing performed prior to the installation of the treatment system. The effluent limitations shall be consistent with all substantive requirements of the Clean Water Act, 33 U.S.C. §1251 et seq., including the application of best available technology economically achievable within the meaning of section 301(b)(2)(A) of the Clean Water Act, 33 U.S.C. §1311(b)(2)(A), as well as any more stringent effluent limitations necessary to meet (1) water quality standards established pursuant to Part 21 of Michigan Act 245 and the Clean Water Act, 33 U.S.C. §1251 et seq., prior to discharge of the treated water to the wetlands or the Clinton River (such standards established pursuant to the NPDES permit program) or, alternatively, (2) pretreatment requirements for discharge to the DWSD treatment plant (such pretreatment requirements to be established by DWSD).

EPA, in consultation with MDNR, may issue an "authorization to discharge" which shall include effluent limits conforming to criteria set forth within this section; discharge monitoring requirements; and all other substantive terms and conditions of an NPDES permit.

No permit shall be required of Settling Defendants to discharge the treated water to the wetlands or the Clinton River, as the discharge of the water shall be considered to be on-site pursuant to the provisions of 42 U.S.C. §9621(e)(1). For any on-site discharge to the DWSD sewerline, Settling Defendants shall meet the substantive requirements of any pretreatment permit necessary to discharge to a DWSD wastewater treatment plant. Discharge of water to a DWSD treatment plant may be considered to be off-site (depending on the location of the discharge point) and would then be discharged in accordance with the requirements set forth in any pretreatment permit issued by the City of Detroit or the State of Michigan.

a. Discharge Monitoring and Reporting Requirements for the Wetlands or the Clinton River

Compliance with any effluent limitations set forth in the NPDES requirements or authorization to discharge, and as established pursuant to Section II.E.4 of this SOW, shall be determined by analysis of samples of treated groundwater collected at the point of discharge to the wetlands or the Clinton River. Settling Defendants shall collect, analyze and report the results of all such samples in accordance with requirements set forth in the authorization to discharge referred to above and in the approved Operations & Maintenance ("O&M") Plan referred to in Section III of the SOW.

b. Discharge Monitoring and Reporting Requirements for the DWSD POTW

Compliance with any pretreatment requirements, as determined by the DWSD and as established above, shall be determined by sampling and analysis of treated groundwater at the point such groundwater is introduced into the sanitary sewer. Settling Defendants shall collect, analyze and report the results of all such samples in accordance with requirements set forth in any applicable permit that may be required and issued by the DWSD.

5. Operational Time Period: Cease Operations Petition

Settling Defendants shall continuously operate the groundwater extraction system until a petition to cease operation of such system is approved by EPA, in consultation with MDNR. Any petition to cease operation of the groundwater extraction system shall include documentation conforming to the requirements of this SOW showing that the groundwater Cleanup Standards have been continuously achieved for at least 24 months. During this 24-month period, Settling Defendants shall collect and analyze groundwater samples on a quarterly basis from all extraction and monitor wells (i.e., at least 8 samples from each compliance point). Samples collected during the Second, Third, Fourth, Fifth, Sixth, and Seventh sampling events during this 24-month period shall be analyzed for each of the contaminants listed in Table 1. All other groundwater samples (i.e., the First and Eighth sampling events) collected during the 24-month period shall be analyzed for the hazardous substances, pollutants, and contaminants on the Hazardous Substances List approved by EPA in the QAPP.

All petitions to cease operation of the groundwater extraction system shall also include: (i) results of analyses of all groundwater samples collected during the 24-month period from each extraction and monitor well, and (ii) all individual substance and cumulative carcinogenic risk determinations and Hazard Index calculations performed in accordance with the provisions of Sections II.E.2.a and II.E.2.b, above. Settling Defendants shall

demonstrate to EPA and MDNR that there shall be no likelihood that further landfill contamination of groundwater outside of the source containment system will cause the contaminant levels to exceed the groundwater Cleanup Standards listed in Table 1 once the extraction system is shut down.

6. Correction of Deficiencies/Adverse Hydrologic Consequences

If the groundwater monitoring program indicates that insufficient water is being withdrawn by the extraction system so that groundwater contaminant concentrations in the leading edge of the plume are not decreasing or that groundwater contaminant concentrations are not decreasing at the rate necessary to achieve Cleanup Standards within 30 years, EPA, in consultation with MDNR, may notify Settling Defendants of the deficiency. Upon notice of a deficiency, Settling Defendants shall provide to EPA, within 30 days of the notice, a plan for corrective action. If EPA disapproves all or a portion of the plan, Settling Defendants shall submit a revised corrective action plan to EPA within 10 business days of notification by EPA of disapproval of the plan and receipt of comments. Upon EPA approval of the corrective action plan, Settling Defendants shall implement the plan in accordance with the timetable in the approved plan.

In the event that during operation of the groundwater extraction system adverse hydrologic consequences occur (such as lowering the water table enough to impact drinking water wells), Settling Defendants shall immediately notify EPA of such occurrence. To the extent that such occurrence causes or threatens a release of a hazardous substance into the environment which presents or may present an imminent and substantial endangerment to public health or welfare or the environment, Settling Defendants shall immediately take all appropriate action as required under Section XXIV of the Consent Decree. Within 30 days of notice to EPA of an adverse hydrologic consequence, Settling Defendants shall submit a plan for corrective action, in writing, to EPA. If EPA disapproves all, or a portion of the plan, Settling Defendants shall submit a revised corrective action plan to EPA within 10 business days of notification by EPA of disapproval of the plan. Upon EPA approval of the corrective action plan, Settling Defendants shall implement the plan in accordance with the timetable in the approved plan.

Should a drinking water well be affected, Settling Defendants shall take corrective action as soon as possible, but no later than 7 days after Settling Defendants receive constructive notice of this adverse hydrologic consequences.

7. Post Shutdown Monitoring

After discontinuing operation of the groundwater extraction system, Settling Defendants shall perform monitoring of groundwater, in accordance with provisions of the approved Operations and

Maintenance Plan, to document the concentrations of hazardous substances, pollutants and contaminants in such groundwater outside of the source containment system at the Site. Such monitoring shall continue until Settling Defendants demonstrate that the Cleanup Standards have been continuously satisfied for thirty (30) years following final shutdown of the groundwater extraction system.

8. Restart

If groundwater monitoring, as set forth under Section II.E.7, above, indicates that the concentration of any hazardous substance, pollutant, or contaminant increased above the groundwater Cleanup Standards after groundwater extraction and treatment has been terminated, in accordance with Section II.E.5, above, Settling Defendants shall notify EPA and resample the offending monitor well(s) within 15 days of obtaining the data. Should the second sample exceed a groundwater Cleanup Standard in Table 1, Settling Defendants shall sample the offending monitor well(s) once a month for three additional months (for a total of five monthly samples). Should each of these samples exceed any of the groundwater Cleanup Standards in Table 1, Settling Defendants shall reactivate the groundwater extraction system. Settling Defendants shall thereafter operate and maintain the groundwater extraction system until Settling Defendants again demonstrate compliance with the groundwater Cleanup Standards as provided in Section II.E.5, above.

EPA will not require restart to be triggered should one of the five consecutive monthly samples meet groundwater Cleanup Standards. Settling Defendants may reactivate the groundwater extraction system if approved by EPA. However, the monthly sampling shall not cease until four consecutive samples do not exceed groundwater Cleanup Standards.

F. Fence Installation

Upon completion of remedial action construction, Settling Defendants shall install a fence around the designated portions of the Site (see Figure 8) to reduce risks which may be imposed on public health due to exposure to hazardous substances, pollutants, and contaminants at the Site and also to protect the cap and treatment equipment from vandalism. The fence shall consist of six-foot high chain link with three-strand barbed wire. The fence shall enclose areas of remedial construction at the Site (see Figure 8) (i.e., groundwater treatment system components, source containment system, cap, and, if necessary, thejunkyard) and shall be equipped with a minimum of one swing gate. Standard Superfund warning signs shall be posted at 200-foot intervals along the fence and on the gate(s). Portions of the current fence may be utilized as practicable to achieve this requirement.

The current fence shall be maintained to protect the public from risk due to construction activity or exposure to hazardous chemicals at the Site during the cleanup process.

Once the PCB soils and sediment removal is complete, in accordance with Section II.D, above, the current fence shall be removed from the Rochester-Utica Recreational Area, to the maximum practicable extent as determined by EPA, in consultation with MDNR, to facilitate the reopening of the State lands.

G. Groundwater, Surface Water, and Sediment Monitoring Program

Settling Defendants shall design, for EPA approval, in consultation with MDNR, and implement a groundwater monitoring program designed to detect changes in the chemical concentration of the groundwater at the Site. The groundwater monitoring program shall include collection and field and laboratory analysis of samples from the monitor wells (Figure 9) located at the Site. In addition, samples shall be taken from the surface waters and sediments in the areas designated in Figure 10 until the PCB excavation program is completes (see Section II.D, above). The samples shall be used to monitor chemical concentrations in the sediments and surface waters to detect adverse conditions (if any) caused by the Site in the Rochester-Utica Recreational Area, the wetlands, the Clinton-Kalamazoo Canal, and the Clinton River.

1. Groundwater: Additional Wells/Monitoring Locations

Settling Defendants shall collect and analyze groundwater samples from each of the existing monitor wells shown in Figure 9. Additional monitor wells shall be installed, as shown in Figure 9, to facilitate the monitoring requirements below. As shown in Figure 9, four additional monitor wells shall be screened in the upper portion of the aquifer (0-10 feet below the water table) and four additional monitor wells shall be screened in the lower portion of the aquifer (15-25 feet below the water table).

2. Surface Water and Sediment: Sampling Locations

Until the source containment system and cap are installed and the PCB excavation task is completed, Settling Defendants shall sample and analyze surface waters and sediments in the woodlands and wetlands south and west of the landfill areas, and in the Clinton River, as designated in Figure 10.

3. Sampling Frequency

(a) Groundwater

After the Consent Decree has been lodged and prior to U.S. EPA approval for start-up of the groundwater extraction system ("Date of Acceptance") Settling Defendants shall sample the designated

groundwater monitor wells (see Figure 9) on a semi-annual basis to monitor the plume. Required field analyses and laboratory analyses are identified in Section II.G.4, below.

After the Date of Acceptance by EPA of the groundwater extraction system, Settling Defendants shall sample each monitor well on a quarterly basis for the first two years of operation of the groundwater extraction system. Settling Defendants shall sample the monitor wells semi-annually for three to five years after the Date of Acceptance, and annually thereafter. Required field and laboratory analyses are identified in Section II.G.4, below. Monitor wells shall be sampled for at least 30 years. Monitoring results shall be used to show compliance or noncompliance with applicable or relevant and appropriate requirements ("ARARs"), whether additional groundwater Cleanup Standards are required, and to demonstrate the effectiveness of the groundwater extraction system at capturing and drawing back the plume.

EPA, in consultation with MDNR, shall determine the need for additional groundwater monitoring 30 years after the commencement of monitoring. This determination shall be based upon whether ARARs have been met and whether additional groundwater work shall be required to reach groundwater Cleanup Standards (see Table 1).

(b) Surface water and sediments

Settling Defendants shall sample surface water and sediments on an annual basis. Monitoring results shall be used to demonstrate compliance or noncompliance with ARARs and to demonstrate that protection of human health and the environment is being maintained until the PCB excavation program is completed (see Section II.D, above) and the source containment system and cap are installed (see Sections II.A and II.B).

4. Analyses

(a) Groundwater

Settling Defendants shall perform field analyses, including, at a minimum, groundwater elevation, pH, temperature, and specific conductivity, and laboratory analyses for the compounds presented in Table 1 of this SOW. If additional information (see Section II.G.5, below) indicates that the groundwater sampling program is not monitoring the entire contaminant plume or that there are additional chemical parameters of concern to EPA, then EPA, in consultation with MDNR, may require that additional groundwater monitor wells or sampling parameters be added to the regular sampling program.

(b) Surface water and sediments

Settling Defendants shall perform laboratory analyses for the compounds listed in Table 1, as well as for PCBs.

5. Additional Information

Additional information shall be gathered by Settling Defendants by implementing a full Hazardous Substance List analysis program, as approved by EPA in the QAPP, once every five years. If additional compounds are found to be above SDWA Maximum Contaminant Levels (MCLs), non-zero Maximum Contaminant Level Goals (MCLGs), or clean-up standards derived under Michigan Act 307, Type B criteria, those compounds shall be added to Table 1 as groundwater Cleanup Standards. The Cleanup Standard will be the more stringent of the MCLs or that cleanup standard derived under Michigan Act 307, Type B criteria as determined by EPA, in consultation with MDNR. If a compound not listed in Table 1 exceeds a lifetime carcinogenic risk of 1×10^{-6} or a hazard index value of 1.0, calculated under standard risk assessment assumptions as set forth in Sections II.E.2.a and II.E.2.b of the SOW, then the compound shall be added to Table 1. The groundwater Cleanup Standard established for such compound shall be at the level which represents a 1×10^{-6} risk or a 1.0 hazard index value, provided that the groundwater Cleanup Standard exceeds the natural background concentration of the contaminant. If the naturally occurring background level for the compound not listed in Table 1 is higher than the 1 x 10-6 risk level or 1.0 hazard index level, the background level will be the Cleanup Standard.

H. Air Monitoring

Settling Defendants shall perform air emission monitoring of treatment systems and assure that air toxics criteria are met, in accordance with the Clean Air Act (40 C.F.R. Parts 50 and 52) and Michigan Act 348. Treatment systems include the groundwater treatment system and the cap gas-venting system. EPA may determine, under the substantive requirements of an air permit under Michigan Act 348, that Settling Defendants must monitor, collect, and treat the air stripper air emissions. If EPA, in consultation with MDNR, requires treatment, Settling Defendants shall design a treatment system that complies with Michigan Act 348 and submit the design to EPA and MDNR. If EPA, after consultation with MDNR, disapproves of the design, Settling Defendants shall resubmit the design 30 days after receipt of comments. Settling Defendants shall implement the design upon EPA approval.

J. Disposal of Groundwater Treatment Sludges

In accordance with 40 C.F.R. Part 268, Settling Defendants shall test (TCLP test) metal sludges produced during the water treatment

process to determine whether they are RCRA characteristic wastes. If any sludge is RCRA characteristic, Settling Defendants shall treat that sludge, in accordance with the requirements of the Land Disposal Restrictions as set forth in 40 C.F.R. Part 268, prior to disposal in a RCRA-permitted facility.

K. Wetlands

Settling Defendants shall design and implement a wetlands replacement program to account for all wetland resources lost or adversely affected by the Site remediation. Figure 11 designates the affected wetlands area which shall be capped and thereby lost or adversely affected by the remediation.

Settling Defendants shall submit the design for the wetlands replacement program to EPA for review and approval, in consultation with MDNR.

L. Municipal Water Supply

Settling Defendants shall attach the residences and businesses designated in Figure 12, and from whom Settling Defendants have obtained consent, to the local municipal water supply within 12 months after the lodging of the Consent Decree. Settling Defendants shall then properly abandon the private drinking water wells in accordance with State law.

M. Technology Review

The ROD determined that current technologies would not be practicable to treat the principal threat posed by the Phase I landfill area. Settling Defendants shall institute a technology review, concurrent with each of the 5-year reviews undertaken by EPA pursuant to Section VIII ("Periodic Review") of the Consent Decree, to evaluate the effectiveness of emerging in situ treatment technologies in treating the Phase I landfill area contaminants and/or the threat in the Phase II and Phase III landfill areas of the Site. Settling Defendants shall submit the results of their review to EPA and MDNR within three months of the completion of each EPA 5-year review. The evaluation will seek to determine whether any such technologies would effectively decrease the levels of contamination within the containment system so as to (1) reduce the long-term risks associated with the contaminants, (2) reduce the risk of failure of the containment remedy due to the high concentrations of contaminants, and/or (3) reduce the risk of exposure to contaminants due to a failure of the containment system.

EPA, in consultation with MDNR, shall then determine whether a technology is sufficiently developed (e.g., in situ bioremediation) to treat in an effective, safe, and cost-effective manner the

principal threat in the Phase I landfill area and/or the threat in the Phase II and Phase III landfill areas.

N. Institutional Controls

Settling Defendants' actions shall be consistent with all institutional controls, including deed restrictions, imposed on the property occupied by the Site, including any institutional controls agreed to by the G&H Landfill property owner, the Estate of Leonard Forster.

Settling Defendants shall use best efforts to timely attain all additional deed restrictions, easements, land-use limitations, or other enforceable instruments restricting private property use that may be necessary to prevent interference with, and completion of, the Work to be performed on the Site under the Consent Decree. Settling Defendants shall file each additional instrument executed pursuant to this paragraph within five (5) business days of its execution.

III. SCOPE

The RD/RA shall consist of five tasks:

Task 1: RD/RA Work Plan

A. RD Work Plan
B. RD/RA Work Plan

Task 2: Remedial Design

A. Design Plans and Specifications
B. Cost Estimate
C. Project Schedule
D. Construction Quality Assurance Objectives
E. Health and Safety Plan
F. Operation and Maintenance Plan
G. Design Phases
H. Community Relations Support

Task 3: Remedial Action Construction

A. Responsibility and Authority
B. Construction Quality Assurance Personnel Qualifications
C. Inspection Activities
D. Sampling Requirements
E. Documentation
F. Community Relations Support

Task 4: Operation and Maintenance Implementation

Task 5: Reports

A. Progress
B. Draft
C. Final

Task 1: RD/RA WORK PLAN

A. RD Work Plan. Settling Defendants shall prepare and submit to EPA for approval, in consultation with MDNR, and in accordance with the Submission Schedule set forth below, an RD Work Plan which describes the overall management strategy for the design phase of the remedial action. Plans and schedules for groundwater treatability testing, slurry wall compatibility testing, plans and schedule for PCB soil/sediment investigation, and remedy implementation shall be included in the RD Work Plan. The draft RD Work Plan is due 60 days after lodging of the Consent Decree. The final RD Work Plan is due 45 days after Settling Defendants receive EPA comments on the draft RD Work Plan. The RD Work Plan shall also include a description of the responsibility, authority and qualifications of key personnel directing the RD, including contractor personnel.

B. RD/RA Work Plan. Settling Defendants shall prepare and submit to EPA for approval, in consultation with MDNR and in accordance with the Submission Schedule set forth below, a draft RD/RA Work Plan. The RD portion of the RD/RA Work Plan is described above. The RA portion of the RD/RA Work Plan shall describe the overall management strategy for performing the construction, operation and maintenance, and monitoring of the remedial action. To the extent known, the RD/RA Work Plan shall also describe the responsibility, authority, and qualifications of all organizations and key personnel involved with the implementation of the Work required under the Consent Decree and this SOW.

Task 2: REMEDIAL DESIGN

Settling Defendants shall prepare and submit to EPA for approval, in consultation with MDNR, and in accordance with the Submission Schedule set forth below, preliminary, intermediate, prefinal, and final construction plans and specifications to implement the remedial action at the Site.

A. Design Plans and Specifications

Settling Defendants shall develop clear and comprehensive design plans and specifications which include, but are not limited to, the following:

1. Discussion of the design strategy and the design basis, including:

   a. Compliance with all applicable and relevant and appropriate environmental and public health standards; and

   b. Minimization of adverse environmental and public impacts.

2. Discussion of the technical factors of importance including:

   a. Use of currently accepted environmental control measures and technology;

   b. The constructability of the design; and

   c. Use of currently acceptable construction practices and techniques.

3. Description of assumptions made and detailed justification of these assumptions.

4. Discussion of the possible sources of error, including references in the Operation and Maintenance Plan to possible operation and maintenance problems.

5. Detailed drawings of the proposed design including:

   a. Qualitative flow sheets; and

   b. Quantitative flow sheets.

6. Tables listing equipment and specifications.

7. Tables giving material and energy balances.

8. Appendices including:

   a. Sample calculations (one example presented and explained clearly for significant or unique design calculations);

   b. Derivation of equations essential to understanding the report;

   c. Groundwater treatability study and pump test work plans; and

   d. Results of laboratory and field tests.

B. Cost Estimate

Settling Defendants shall develop cost estimates to construct and implement the remedial action. The cost estimate developed in the FS shall be refined to reflect the more detailed/accurate design plans and specifications being developed. The cost estimate shall include both capital and, in the Operation and Maintenance Plan, the operation and maintenance costs. Should EPA determine that it must assume the RD/RA responsibility, Settling Defendants, upon request, shall provide the most recent cost estimates to EPA.

C. Project Schedule

Upon EPA approval of the RD/RA Work Plan, Settling Defendants shall develop an expedited Project Schedule for construction and implementation of the remedial action which identifies the dates for initiation and completion of all critical path tasks. An Initial Project Schedule shall be submitted simultaneously with the Prefinal Design Document submission and the Final Project Schedule with the Final Design Document. The Final Project Schedule is subject to review and approval by EPA, in consultation with MDNR.

D. Construction Quality Assurance Objectives

Settling Defendants shall identify and document the objectives and framework for the development of a construction quality assurance program including, but not limited to, the following: responsibility and authority; personnel qualifications; inspection activities; sampling requirements; and documentation.

E. Health and Safety Plan

Settling Defendants shall develop a Health and Safety (H&S) Plan to address the activities to be performed at the Site to implement the remedial action. The H&S Plan shall be submitted to EPA and MDNR for review.

F. Operation and Maintenance Plan

Settling Defendants shall prepare an Operation and Maintenance Plan to provide for the long-term maintenance of the remedial action. The plan shall be composed of the following elements:

1. Description of normal operation and maintenance (O&M):

   a. Description of tasks for operation;

   b. Description of tasks for maintenance;

   c. Description of prescribed treatment or operation conditions; and

d. Schedule showing frequency of each O&M task.

2. Description of potential operating problems:

a. Description and analysis of potential operation problems;

b. Sources of information regarding problems; and

c. Common and/or anticipated remedies.

3. Description of routine monitoring and laboratory testing:

a. Description of monitoring tasks;

b. Description of required laboratory tests and their interpretation;

c. Required data collection, Quality Assurance Project Plan (QAPP);

d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease; and

e. Description of triggering mechanisms for groundwater/surface water monitoring results.

4. Description of alternate O&M:

a. Should systems fail, alternate procedures to prevent releases or threatened releases to protect public health and the environment; and

b. Analysis of vulnerability and additional resource requirements should a failure occur.

5. Corrective Action:

a. Description of corrective action to be implemented in the event that groundwater Cleanup Standards are exceeded in the leading edge of the groundwater contaminant plume or NPDES criteria for discharges to surface waters or DWSD pretreatment criteria, if applicable, are exceeded;

b. Description of corrective action to be implemented in the event that the cap has sustained any form of damage, including, but not limited to, cracking, penetration, and erosion;

c. Description of corrective action to be implemented in the event that air stripper and/or landfill gas emission levels are exceeded; and

d. Schedule for implementing these corrective actions.

6. Safety plan:

a. Description of standard safety practices for site personnel, including, without limitation, precautions and necessary safety equipment; and

b. Safety tasks required in event of systems failure.

7. Description of equipment:

a. Equipment identification;

b. Installation of monitoring components;

c. Maintenance of Site equipment; and

d. Replacement schedule for equipment and installed components.

8. Records and reporting mechanisms required:

a. Operating logs;

b. Laboratory records;

c. Records for operating costs upon takeover;

d. Mechanism for reporting emergencies;

e. Personnel and maintenance records; and

f. Monthly/annual reports to EPA and MDNR.

A draft Operation and Maintenance Plan shall be submitted simultaneously with the Final Design Document and the Final Operation and Maintenance Plan shall be submitted upon completion of construction.

G. Design Phases

The design of the remedial action shall include the phases outlined below.

1. Preliminary design

Settling Defendants shall submit the preliminary design when the design effort is approximately 30% complete. At this stage, Settling Defendants shall have field verified the existing conditions of the Site. The preliminary design shall reflect a level of effort such that the technical requirements of the project

have been addressed and outlined so that they may be reviewed to determine if the final design will provide an operable and usable remedial action. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the remedial action. The preliminary construction drawings by Settling Defendants shall reflect organization and clarity. The scope of the technical specifications shall be outlined in a manner reflecting the final specifications. Settling Defendants shall include design calculations with their preliminary submission, reflecting the same percentage of completion as the designs they support.

2. Correlating plans and specifications

General correlation between drawings and technical specifications is a basic requirement of any set of working construction plans and specifications. Before submitting the project specifications, Settling Defendants shall:

a. Coordinate and cross-check the specifications and drawings; and

b. Complete the proofing of the edited specifications and the cross-checking of all drawings and specifications.

These activities shall be completed prior to the 95% prefinal design submittal to EPA (see Section III.F.6, below).

3. Equipment start-up and operator training

Settling Defendants shall prepare, and include in the technical specifications governing groundwater treatment systems, contractor requirements for providing: appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up and operation of the treatment systems, and training covering appropriate operational procedures once the start-up has been successfully accomplished.

4. Additional studies

EPA, in consultation with MDNR, may require additional studies to supplement the available technical data required to implement the ROD and this SOW. Additional studies may be required for any modification, enhancement, or addition to the remedial design for the remedial action to be performed. Settling Defendants shall complete any additional studies needed and shall furnish all necessary equipment and personnel to do so.

5. Intermediate Design

EPA may require a design review at 60% completion of the project. If required, Settling Defendants' intermediate design submittal

shall include the same elements as the prefinal design, discussed in Section III.F.6, below.

6. Prefinal and Final Design

Settling Defendants shall submit the prefinal/final design documents in two parts. The prefinal design shall be at 95% completion of design. After approval of the prefinal submission, Settling Defendants shall execute the required revisions and submit the complete final documents with reproducible drawings and specifications.

The prefinal design submittal shall consist of the design Plans and Specifications, draft Operation and Maintenance Plan, Project Schedule, draft Groundwater Treatability Study Work Plan, Quality Assurance Project Plan and Specifications for the Health and Safety Plan. In the event of any EPA project takeover request, Settling Defendants shall submit a capital and operating and maintenance cost estimate to EPA.

The final design submittal shall consist of the Final Design Plans and Specifications (100% complete), the Final Operation and Maintenance Plan, Final Quality Assurance Plan, Final Project Schedule, Final Groundwater Treatability Study Work Plan, and Final Health and Safety Plan specifications. The quality of the design documents shall be such that Settling Defendants would be able to include them in a bid package and invite contractors to submit bids for the construction project. In the event of any EPA project takeover request, Settling Defendants shall submit a capital and operating and maintenance cost estimate to EPA.

H. Community Relations Support

A community relations program will be implemented by EPA in consultation with MDNR. Settling Defendants shall cooperate with the EPA and MDNR by participating in the preparation of all appropriate information disseminated to the public and in public meetings that may be held or sponsored by EPA or MDNR to explain activities at or concerning the Site.

Community relations support will be consistent with Superfund community relations policy as stated in the "Guidance for Implementing the Superfund Program" and Community Relations in Superfund - A Handbook.

TASK 3: REMEDIAL ACTION CONSTRUCTION

Following EPA approval, in consultation with MDNR, of the final design, Settling Defendants shall develop and implement a construction quality assurance (CQA) program to ensure, with a reasonable degree of certainty, that the completed remedial action will meet or exceed all design criteria, plans and specifications.

The CQA plan is a Site-specific document which must be submitted to EPA, in consultation with MDNR, for approval prior to the start of the construction. At a minimum, the CQA plan should include the elements which are summarized below. Upon EPA approval of the CQA plan, Settling Defendants shall construct and implement the remedial action in accordance with the approved design schedule and the CQA plan.

A. Responsibility and Authority

Settling Defendants shall fully describe the responsibility and authority of all organizations (e.g., technical consultants, construction firms) and key personnel involved in the construction of the remedial action in the CQA plan. Settling Defendants shall also identify a CQA officer and the necessary supporting inspection staff.

B. Construction Quality Assurance Personnel Qualifications

The qualifications of the CQA officer and supporting inspection personnel shall be presented in the CQA plan to demonstrate that they possess the training and experience necessary to fulfill their identified responsibilities.

C. Inspection Activities

The observations and tests that will be used to monitor the construction and/or installation of the components of the remedial action shall be summarized in the CQA plan. The plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with applicable or relevant and appropriate requirements and include, but not be limited to, air quality and emissions monitoring records and waste disposal records (e.g., RCRA transportation manifests). The inspection shall also ensure compliance with all health and safety procedures. In addition to oversight inspections, Settling Defendants shall conduct the following activities.

1. Preconstruction inspection and meeting

Settling Defendants shall conduct a preconstruction inspection and meeting with representatives of EPA and MDNR to:

a. Review methods for documenting and reporting inspection data;

b. Review methods for distributing and storing documents and reports;

c. Review work area security and safety protocol;

d. Discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed; and

e. Conduct a facility walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

The preconstruction inspection and meeting shall be documented by a designated person and minutes shall be transmitted to all parties.

2. Prefinal inspection

Upon preliminary project completion, Settling Defendants shall notify EPA and MDNR for the purposes of conducting a prefinal inspection. The prefinal inspection shall consist of a walk-through inspection of the entire project at the Site. The inspection is to determine whether the project is complete and consistent with the contract documents and the EPA-approved remedial action(s). Any outstanding construction items discovered during the inspection shall be identified and noted. Additionally, treatment equipment shall be operationally tested by Settling Defendants. Settling Defendants shall certify that the equipment has performed to meet the purpose and intent of the specifications. Re-testing will be completed where deficiencies are revealed. The prefinal inspection report shall outline the outstanding construction items, actions required to resolve items, completion date for these items, and the date for the final inspection.

3. Final inspection

Upon completion of any outstanding construction items, Settling Defendants shall notify EPA and MDNR for the purposes of conducting a final inspection. The final inspection shall consist of a walk-through inspection of the entire project at the Site. The prefinal inspection report will be used as a checklist with the final inspection focusing on the outstanding construction items identified in the prefinal inspection. Settling Defendants shall confirm that outstanding items have been resolved.

D. Sampling Requirements

Settling Defendants shall present sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems as addressed in the project specifications in the CQA plan.

E. Documentation

Reporting requirements for CQA activities shall be described in detail in the CQA plan. This shall include such items as daily

summary reports, inspection data sheets, problem identification and corrective measure reports, design acceptance reports, and final documentation. Provisions for the final storage of all records shall be presented in the CQA plan.

F. Community Relations Support

During remedial action construction, community relations support shall proceed as described in Section II, Task 2.G above.

TASK 4: Operation and Maintenance Implementation

As each component of the remedial action has been approved by EPA, in consultation with MDNR, Settling Defendants shall implement the respective portion(s) of the Operation and Maintenance Plan.

TASK 5: Reports and Submissions

Settling Defendants shall prepare plans, specifications, and reports as set forth in Tasks 1 through 4 to document the design, construction, operation, maintenance, and monitoring of the Work. The documentation shall include, but not be limited to the following:

A. Progress Reports

Settling Defendants shall, at a minimum, provide EPA and MDNR with signed monthly progress reports during the design and construction phases and quarterly progress reports, at a minimum, for operation and maintenance activities containing:

1. A description and estimate of the percentage of the RD/RA completed;

2. Summaries of all findings;

3. Summaries of all changes made in the RD/RA during the reporting period;

4. Summaries of all contacts with representatives of the local community, public interest groups or State government during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel during the reporting period, including qualifications;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, laboratory and monitoring data.

Any changes in personnel during the reporting period shall be subject to review and approval by EPA, in consultation with MDNR.

B. Draft Submittals

1. Settling Defendants shall submit draft RD and RD/RA Work Plans as outlined in Task 1, above;

2. Settling Defendants shall submit draft Construction Plans and Specifications, Design Reports, Schedules, and Study Reports as outlined in Task 2, above. In the event of an EPA project takeover request, the Settling Defendants shall submit an estimate of the capital cost and cost of the operation and maintenance to be performed at the Site;

3. Settling Defendants shall submit a draft construction Quality Assurance Program Plan and Documentation as outlined in Task 3, above;

4. Settling Defendants shall submit a draft Operation and Maintenance Plan as outlined in Task 2, above; and

5. Settling Defendants shall submit a draft Remedial Action Implementation Report at the completion of the project construction. The Report shall document that the project is consistent with the design specifications, and that the remedial action is performing adequately. The Report shall include, but not be limited to, the following elements:

   a. Synopsis of the remedial action and certification by Settling Defendants that the remedial action is constructed as required in the final design;

   b. Explanation of any modifications to the plans and why these were necessary for the project. Any modifications shall be approved by EPA, in consultation with MDNR;

   c. Listing of the criteria, established before initiation of the remedial action, for judging the functioning of the remedial action and also explaining any modification to these criteria;

   d. A demonstration that each component of the remedial action, including, without limitation, the cap and the groundwater treatment system, meets and/or will meet the applicable Performance Standards. Such demonstration, at a minimum, shall consist of:

i) a summary of soil testing results from the landfill cap and slurry wall construction, collected in accordance with the Construction Quality Assurance Project Plan;

ii) water level measurements and pumping records that show groundwater capture is being achieved by the groundwater extraction system pursuant to Section II.E of the SOW;

iii) water level measurements and pumping records that show the hydraulic gradient is being maintained across the slurry wall or trench and FML;

iv) water quality analysis results from the groundwater treatment plant which demonstrates compliance with the discharge criteria under Section II.E.3 and 4 of the SOW; and

v) air quality analysis results upwind and downwind of the landfill demonstrating compliance with air toxics criteria established pursuant to Section II.H of the SOW.

e. Explanation of the operation and maintenance (including monitoring) to be undertaken at the Site; and

f. Data demonstrating that the soil cleanup in the area south of the landfill and in the Junkyard has been completed pursuant to Section II.C, D, and G of the SOW and that the remedial action has been, and is being, implemented as designed.

C. Final Submittals

After EPA and MDNR review and comment on draft submissions, Settling Defendants shall finalize, for EPA approval, the RD/RA Work Plans, Design Reports, Construction Plans and Specifications, Cost Estimates upon takeover request, Project Schedule, Operation and Maintenance Plan, Study Reports, Construction Quality Assurance Program Plan and Documentation, and the Remedial Action Implementation Report.

Submission Schedule

Settling Defendants' RD/RA Work Plan shall comply with the information reporting requirements presented below:

Submission	Due Date
Draft RD Work Plan (Task 1)	60 days after the lodging of the Consent Decree.

Submission	Due Date
Draft RD/RA Work Plan (Task 1)	60 days after entry of the Consent Decree.
Final RD Work Plan (Task 1)	45 days after EPA comments on draft RD Work Plan.
Final RD/RA Work Plan (Task 1)	30 days after EPA comments on draft RD/RA Work Plan.
Treatability Test Work Plan (Groundwater/Leachate)	As approved by EPA in the RD/RA Work Plan.
PCB Soil/Sediment Investigation	120 days after EPA approval of the RD/RA Work Plan.
Preliminary Design (30% completion)	
Groundwater, Cap, Source Containment System	120 days after EPA approval of the Final RD/RA Work Plan.
Intermediate Design (60% completion) (if required)	
Groundwater, Cap, Source Containment System	210 days after EPA approval of the RD/RA Work Plan.
Prefinal Design (95% completion)	
Groundwater, Cap, Source Containment System	60 days after EPA comments on Intermediate Design.
Final Design (100% completion)	60 days after EPA approval of the Prefinal Design.
Draft Submittals:	Concurrent with Prefinal Design.

Construction Designs and Specifications
Design Reports
Cost Estimates (Upon takeover request)
Project Schedules
Operation and Maintenance Plan (Task 2)
Construction Quality Assurance Plan (Task 3)

Submission	Due Date
Final Submittals:	Concurrent with Final Design.
Construction Designs and Specifications Design Reports Cost Estimates (Upon takeover request) Project Schedules Operation and Maintenance Plan (Task 2) Construction Quality Assurance Plan (Task 3)	
Construction of Remedial Action	As approved in Final Design.
Performance of Groundwater Treatability Test	As approved in Final Design
Prefinal Inspection Report	30 days after prefinal inspection.
Draft Remedial Action Report (Task 5)	Within 60 days of final inspection.
Completion of Construction	As approved by EPA in the RD/RA Work Plan.
Final Remedial Action Report (Task 5)	45 days after EPA comments on Draft RA Report.
Progress Reports for Tasks 1 through 3	Monthly
Progress Reports during Operation and Maintenance	Quarterly.

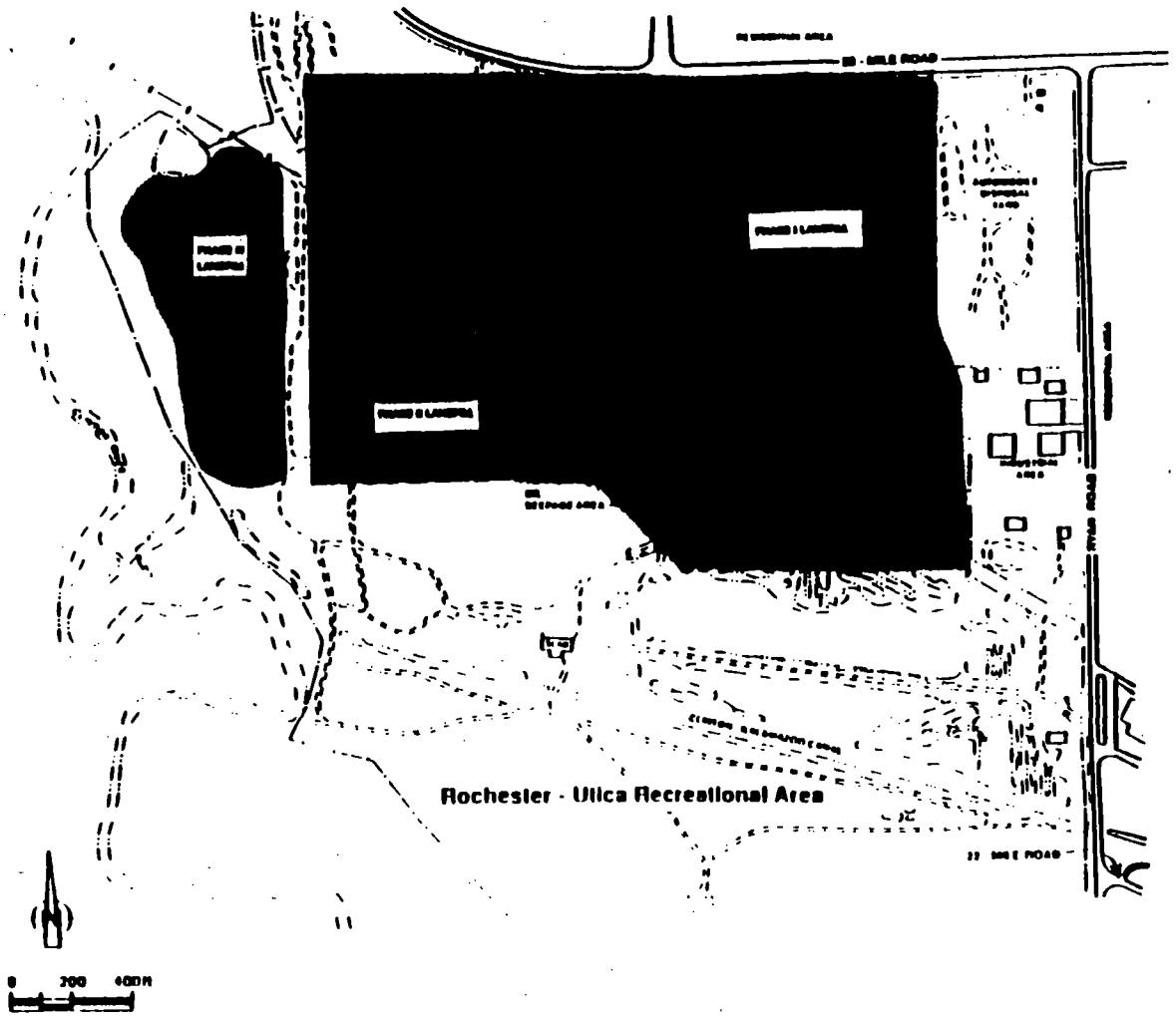

figure 1

LIMIT OF CAP
C & H Landfill

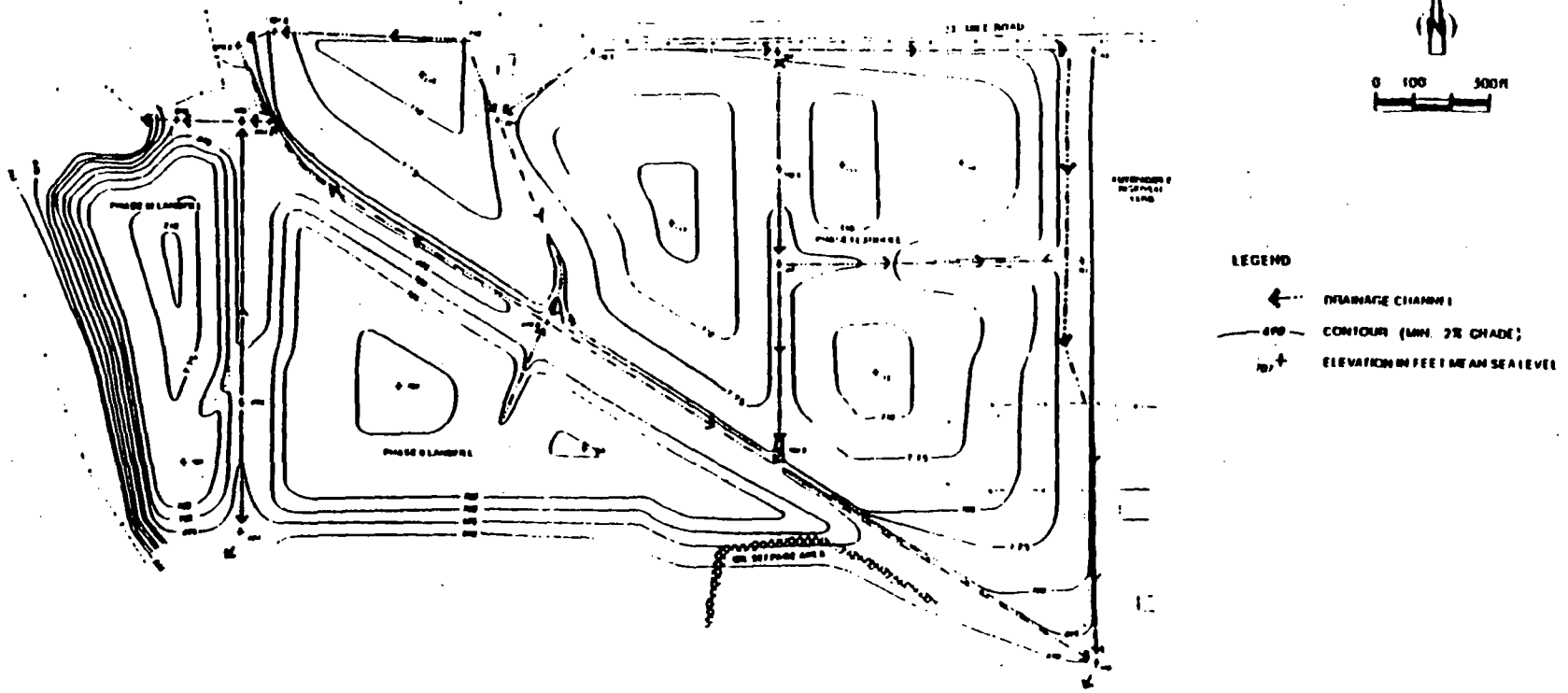

Figure 2
PRELIMINARY SUBGRADE CONTOUR PLAN
G & H Landfill

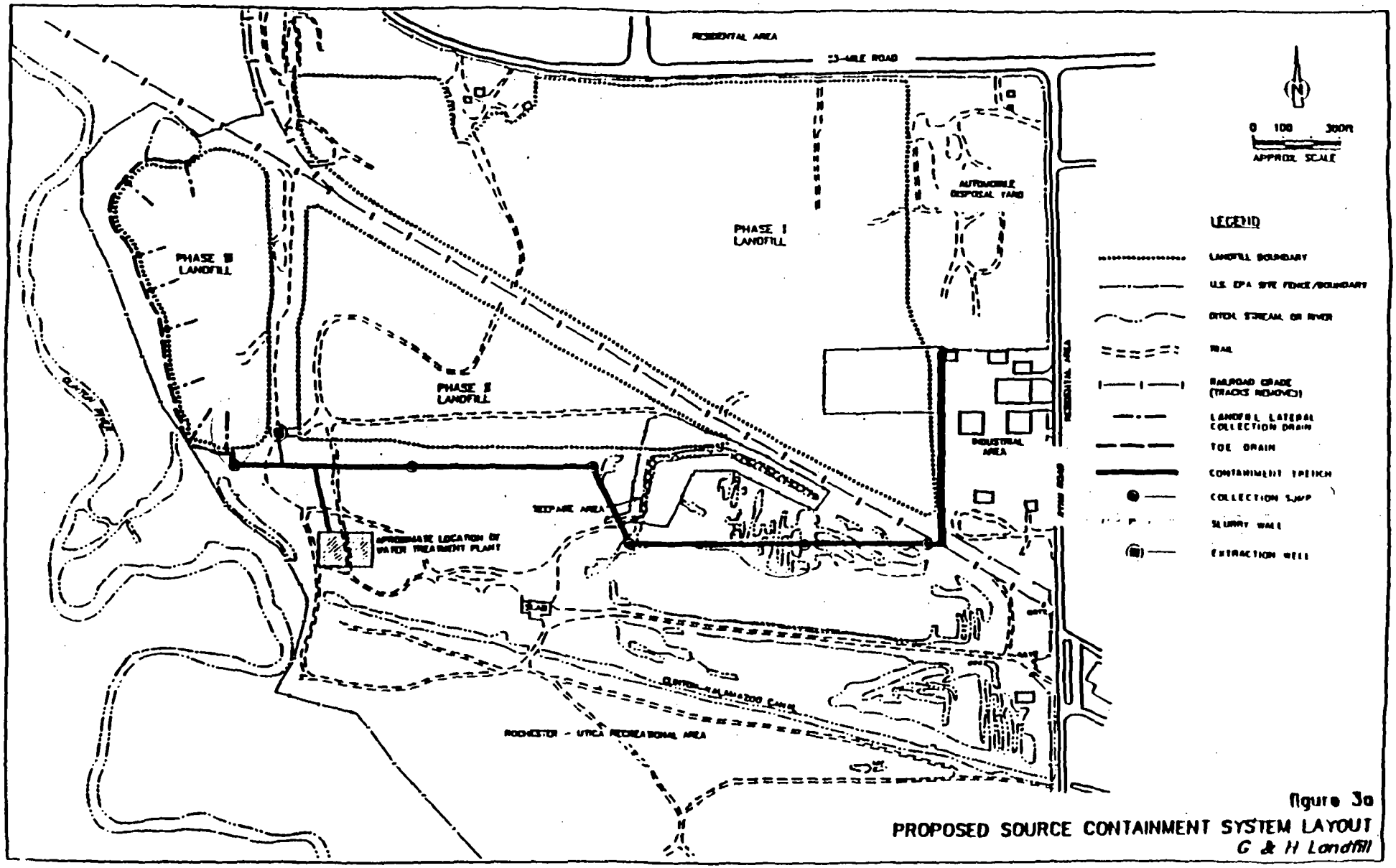

figure 3a

PROPOSED SOURCE CONTAINMENT SYSTEM LAYOUT

G & H Landfill

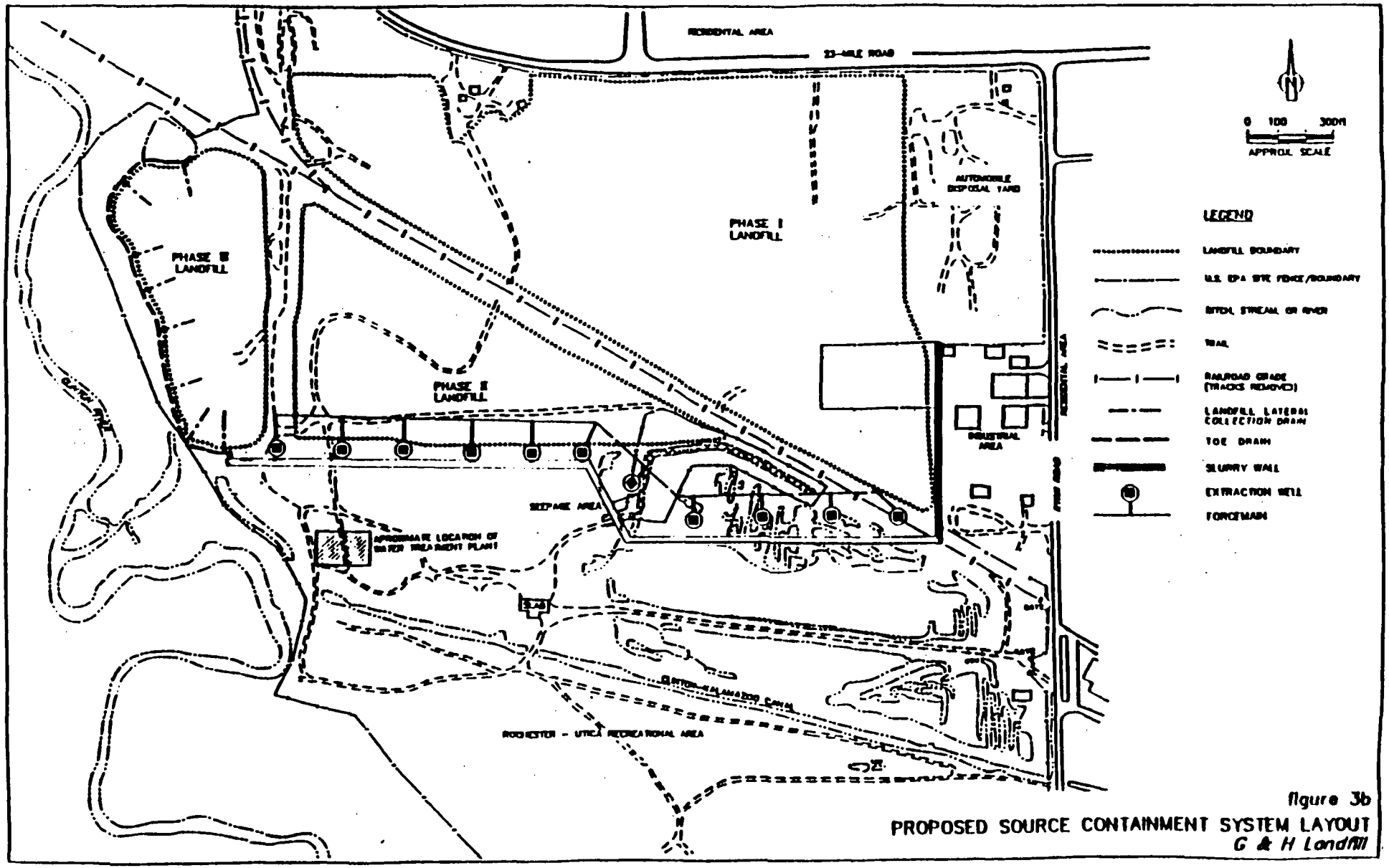

figure 3b

PROPOSED SOURCE CONTAINMENT SYSTEM LAYOUT

G & H Landfill

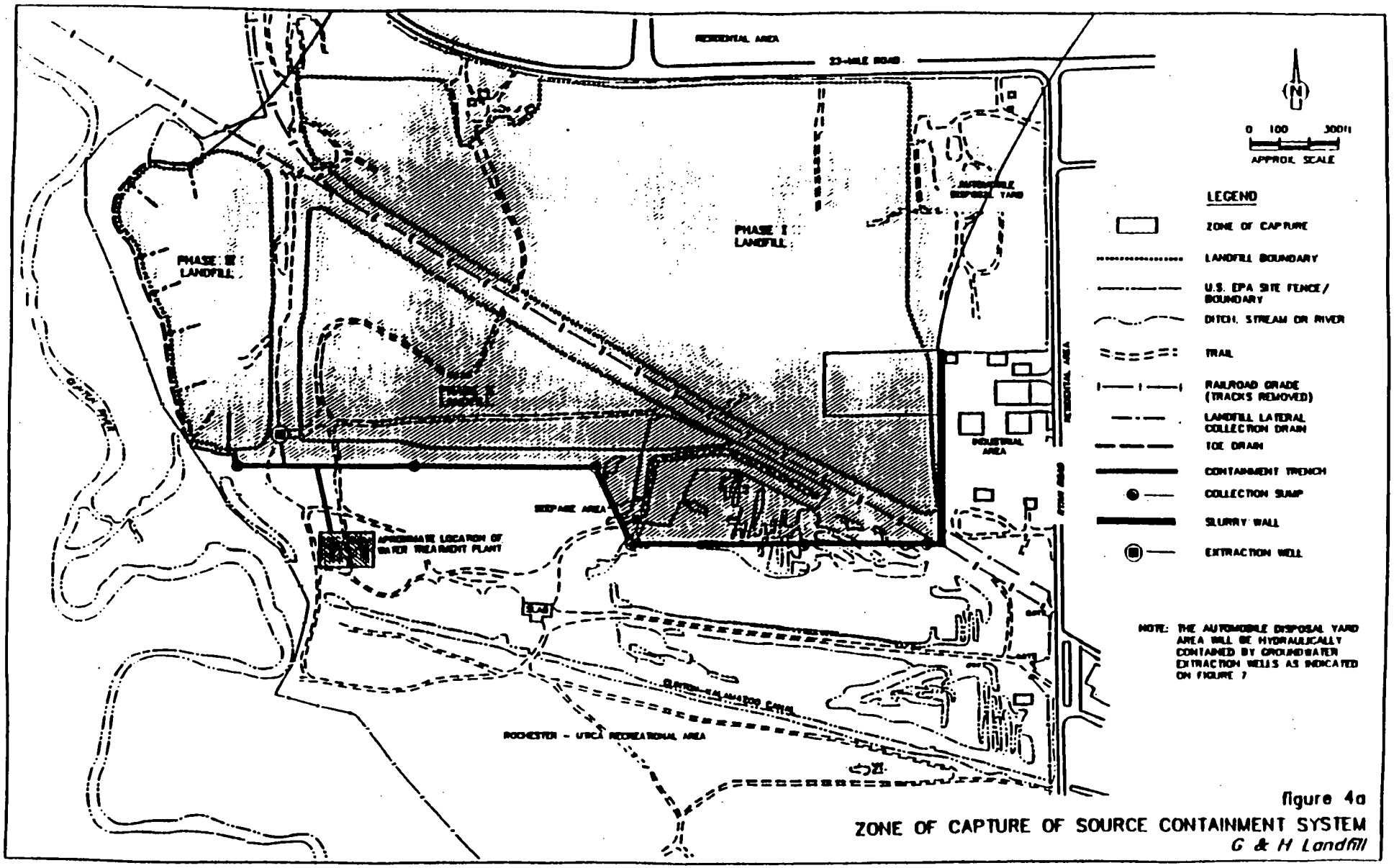

figure 4a

ZONE OF CAPTURE OF SOURCE CONTAINMENT SYSTEM

G & H Landfill

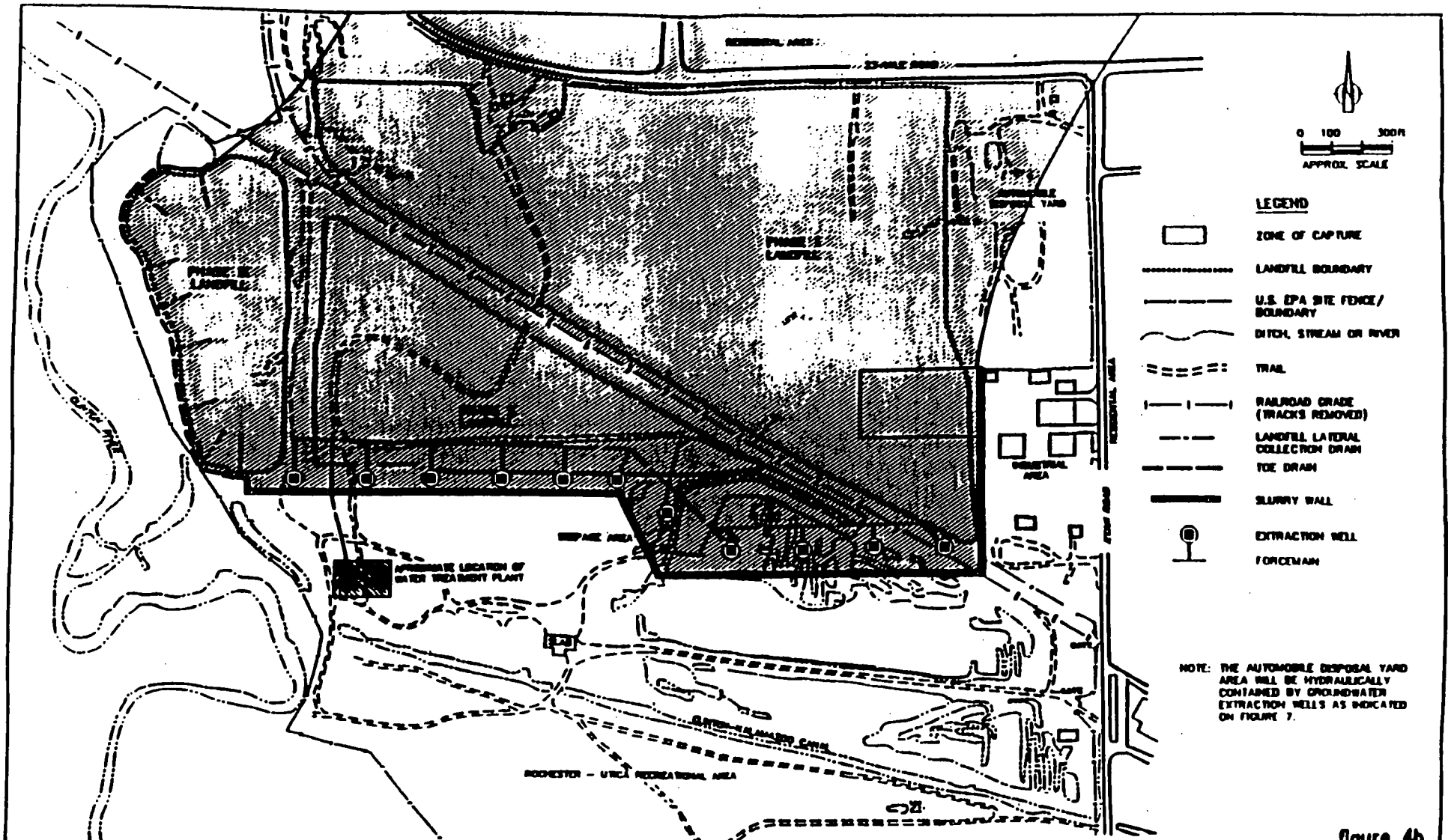

figure 4b

ZONE OF CAPTURE OF SOURCE CONTAINMENT SYSTEM

G & H Landfill

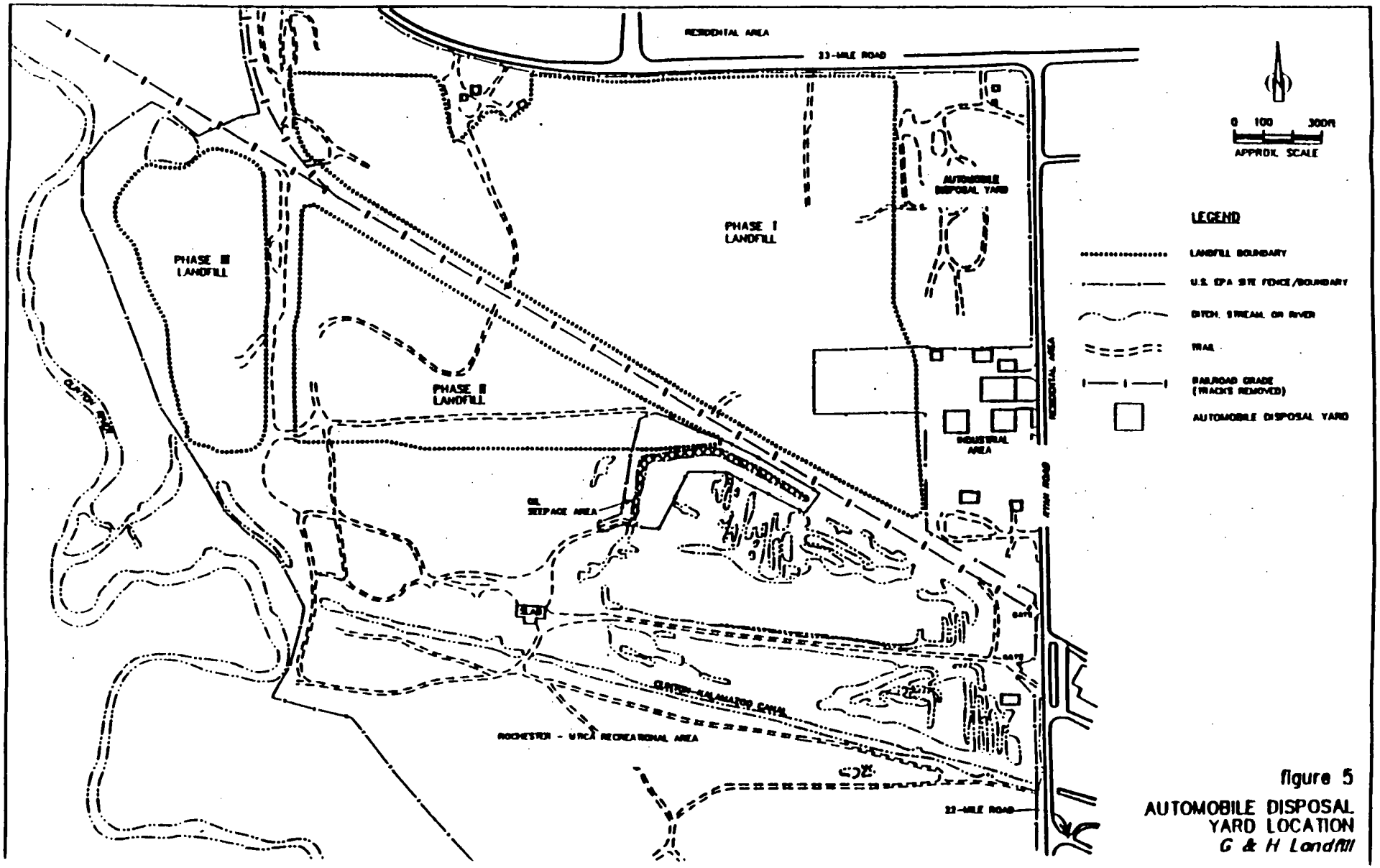

figure 5
AUTOMOBILE DISPOSAL YARD LOCATION
G & H Landfill

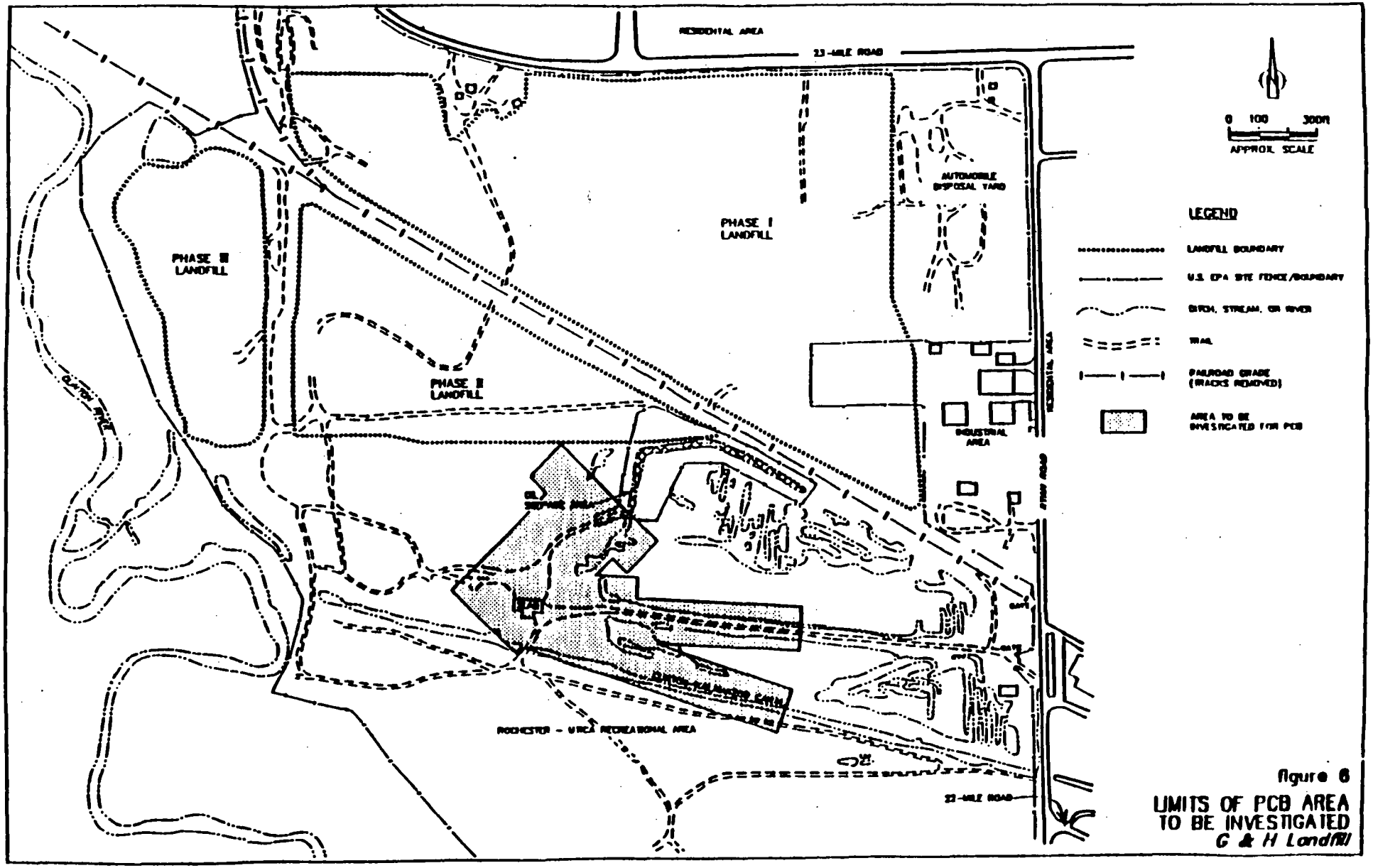

Figure 6

LIMITS OF PCB AREA TO BE INVESTIGATED
G & H Landfill

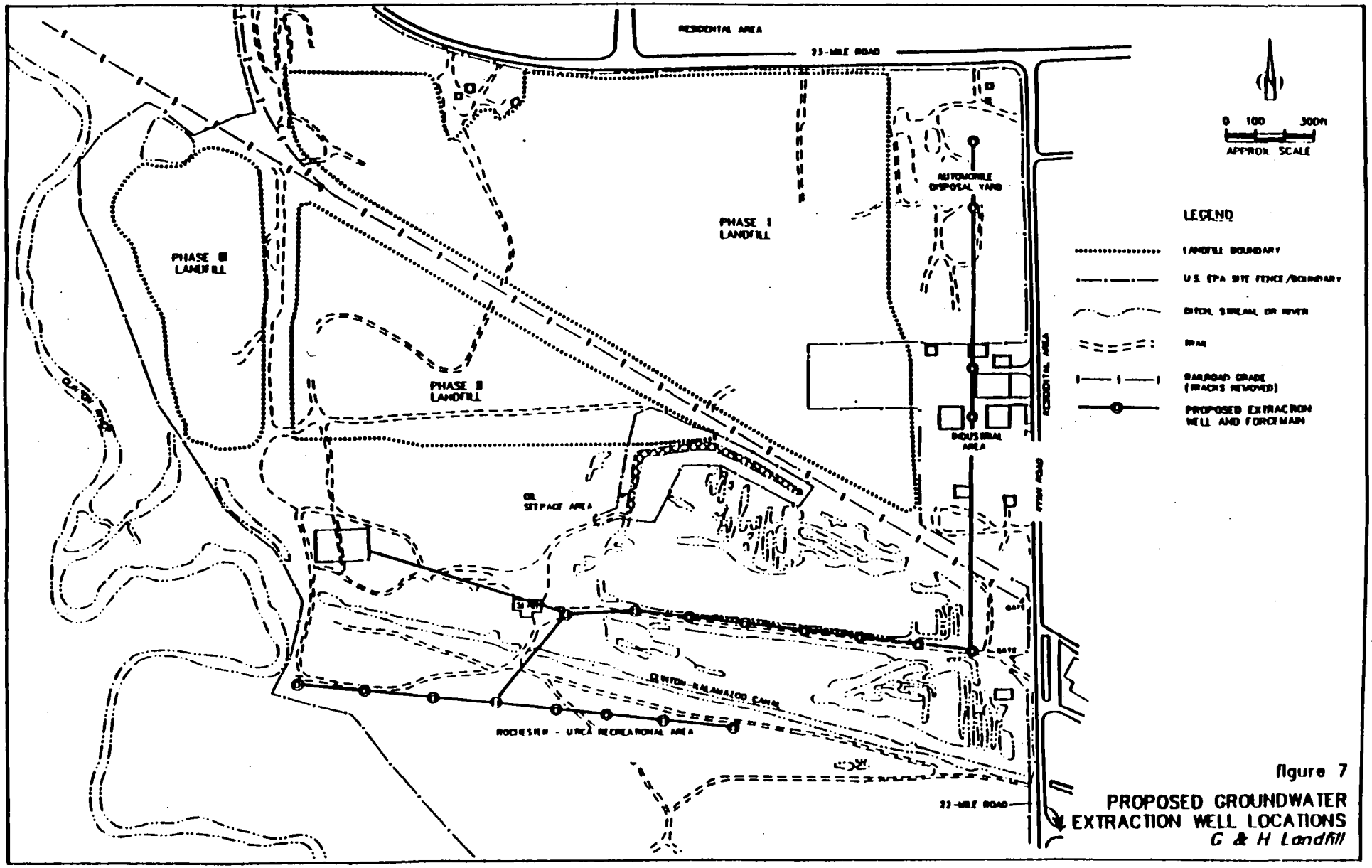

figure 7

PROPOSED GROUNDWATER EXTRACTION WELL LOCATIONS

G & H Landfill

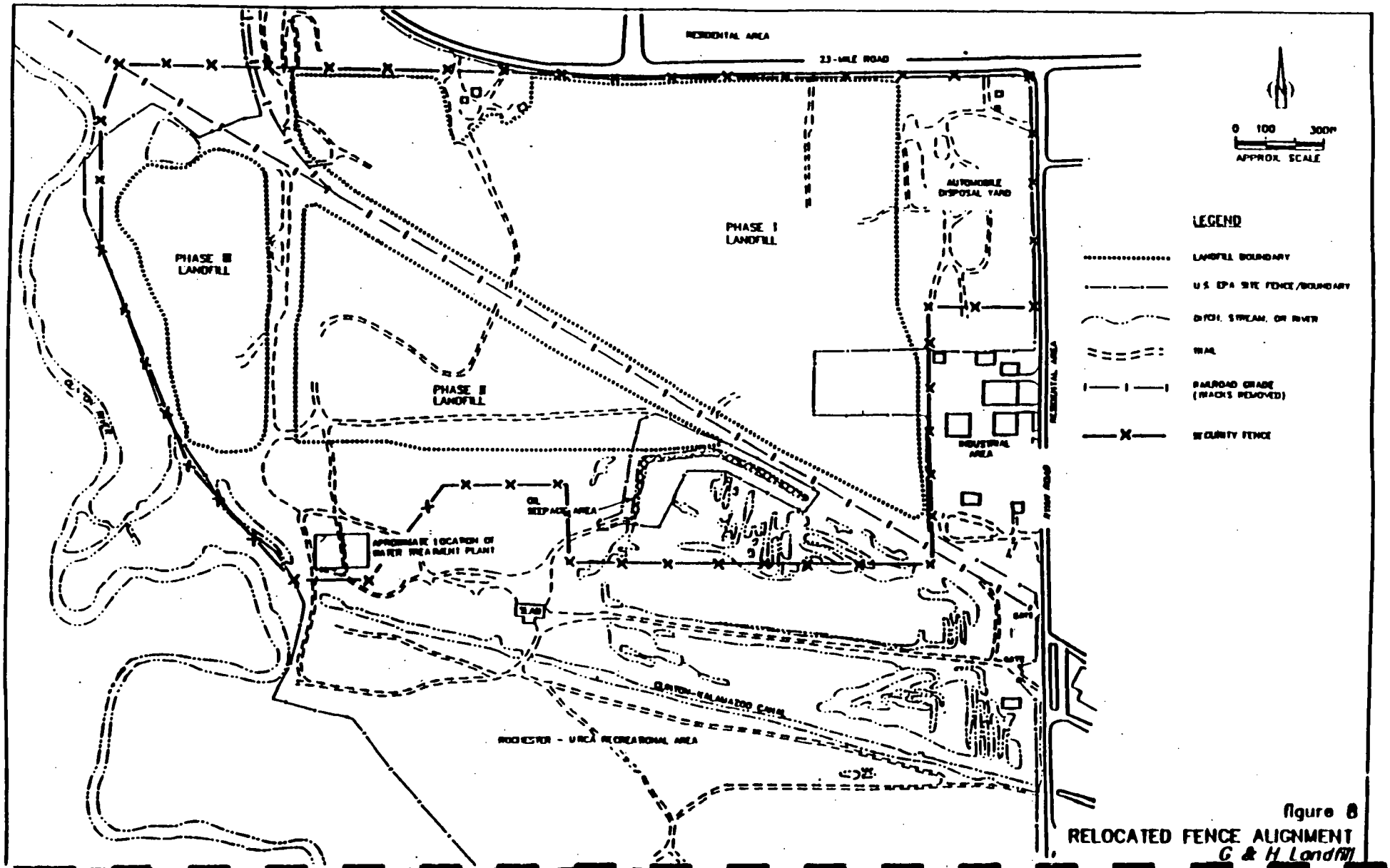

Figure 8
RELOCATED FENCE ALIGNMENT
C & H Landfill

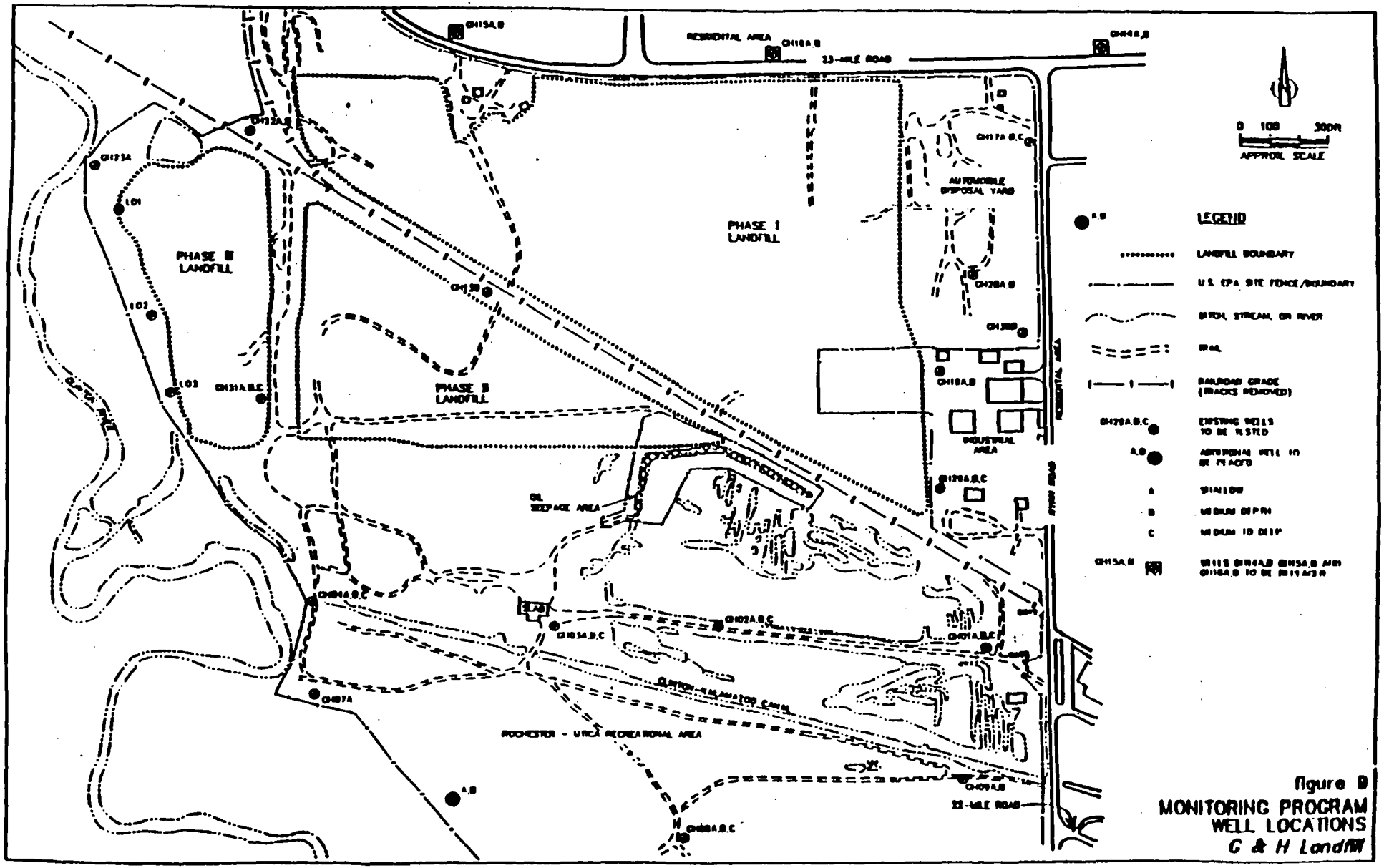

figure 9
MONITORING PROGRAM
WELL LOCATIONS
C & H Landfill

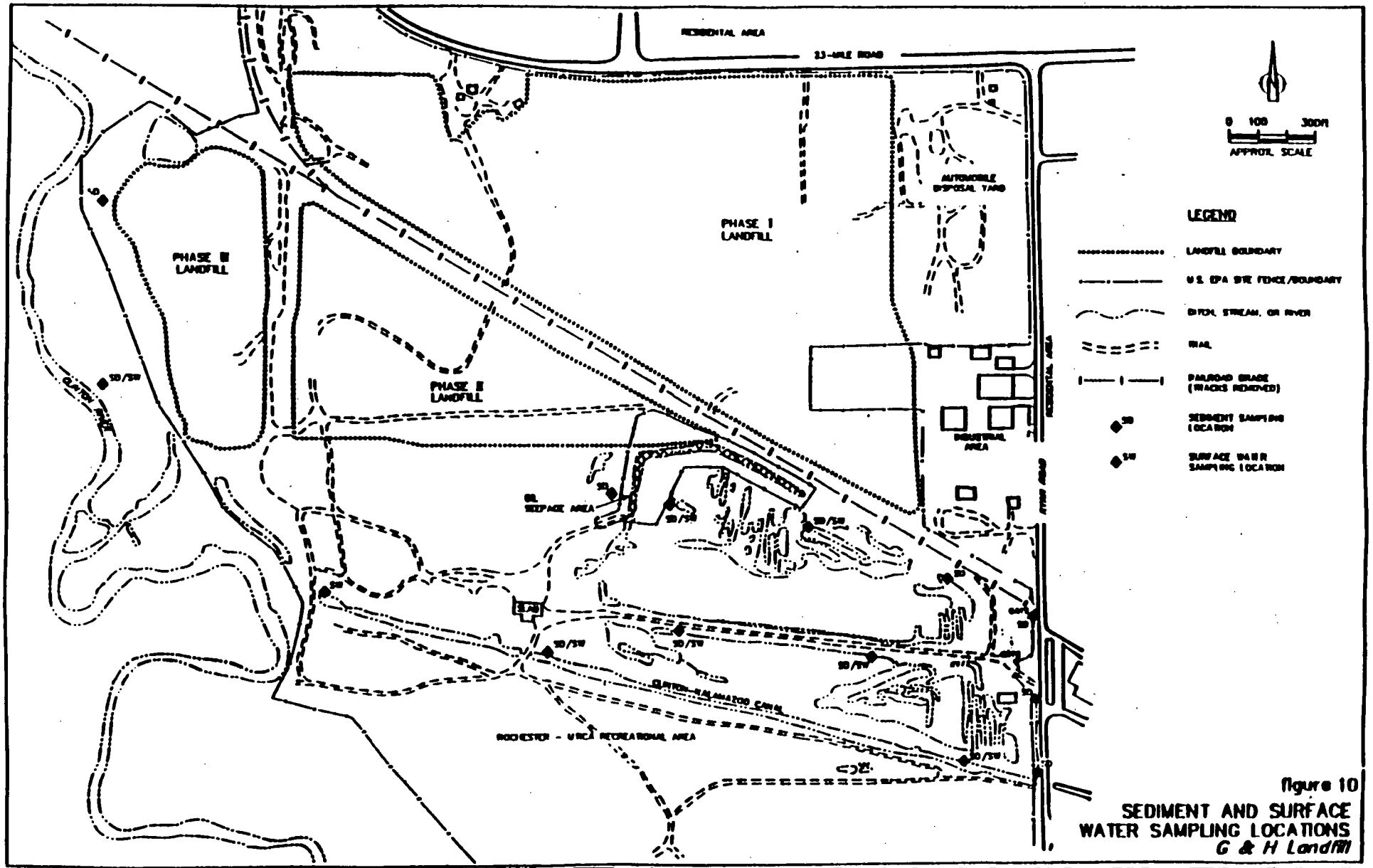

figure 10
SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS
G & H Landfill

APPENDIX B

SUBSTANTIVE REQUIREMENTS DOCUMENT

STATE OF MICHIGAN

JOHN ENGLER, Governor
DEPARTMENT OF ENVIRONMENTAL QUALITY
"Better Service for a Better Environment"
HOLLISTER BUILDING, PO BOX 30473, LANSING MI 48909-7973
INTERNET: www.deq.state.mi.us
RUSSELL J. HARDING, Director

REPLY TO:
SURFACE WATER QUALITY DIVISION
KNAPPS CENTRE
PO BOX 30273
LANSING MI 48909-7773

June 16, 1999

CERTIFIED MAIL -- Z 067 071 675

G & H Landfill PRP Group
c/o Mr. David Tripp, Dykema Gossett
400 Renaissance Center, 35th Floor
Detroit, Michigan 48243

Dear Mr. Tripp:

SUBJECT: Substantive Requirements Document -- No. MIU990012 -- G & H LF PRP Group, 3160 Twenty Three Mile Road, Shelby Township, Macomb County, Michigan -- Superfund Site

The application for modification of substantive requirements for wastewater discharge from the G & H Landfill PRP Group has been processed in accordance with our Divisional Procedures. The enclosed Substantive Requirements Document (SRD) contains the requirements necessary for compliance with state and federal water pollution control laws.

Please review the requirements in the SRD including the monitoring and reporting responsibilities. Discharge Monitoring Report forms will be transmitted to you in the near future. These reports are to be submitted as required by the SRD.

Any report, notifications, or questions regarding the enclosed SRD programs should be directed to the following address:

Mr. Roy Schrameck, District Supervisor
Southeast Michigan District Office, SWQD, DEQ
38980 Seven Mile Road
Livonia, Michigan 48152-1006
Telephone: 734-953-1431

Questions about the basis for the SRD requirements may be directed to Mr. Scott Swenor of the Permits Section at 517-335-4123.

Sincerely,

William E. McCracken

William E. McCracken, Chief
Permits Section
Surface Water Quality Division
517-335-4114

Attachment: Substantive Requirements Document
cc: Mr. Kevin Adler, U.S. EPA, Region 5
Ms. Laura Pobanz, Macomb County Health Department
Mr. Gavin O'Neill, Conestoga-Rovers & Associates
Ms. Lisa Summerfield, Superfund Section, ERD
Mr. Roy Schrameck, Southeast Michigan District Supervisor, SWQD (2)
Mr. William Creal, GLEAS, SWQD
PCS Unit, SWQD
File

MIU990012

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

SUBSTANTIVE REQUIREMENTS DOCUMENT FOR THE G & H LANDFILL SUPERFUND SITE

Authorization to (hereinafter referred to as the "discharger"):

G & H Landfill PRP Group
c/o Mr. David Tripp, Dykema Gosset
400 Renaissance Center, 35th Floor
Detroit, Michigan 48243

is authorized to discharge from a facility located at

G & H Landfill
3160 Twenty Three Mile Road
Shelby Township, Macomb County, Michigan 48316

designated as G & H LF PRP Group

In accordance with Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601 et seq; "CERCLA") and the Superfund Amendments and Reauthorization Act (Public Law No. 99-499, "SARA") the Surface Water Quality Division of the Michigan Department of Environmental Quality, in compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et seq.; the "Act"), and Michigan Act 451, Public Acts of 1994, Part 31, as amended, (the "Michigan Act"), which are legally applicable or relevant and appropriate requirements (ARARs), herein establishes substantive requirements for a discharge of treated groundwater and leachate from the G & H Landfill Superfund Site to an unnamed wetland tributary to the Clinton River in Section 19, T3N, R12E, Shelby Township, Macomb County.

These substantive requirements are based on information (hereinafter referred to as the "application") received on January 27, 1995, as amended through April 27, 1999, from G & H Landfill PRP Group, which provided a description of the wastewater characteristics and proposed treatment. If new information is received subsequent to the date of this document, these substantive requirements may be revised if necessary to protect the receiving waters consistent with the Act and the Michigan act.

This document is not a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits are not required for on-site remedial actions associated with Superfund cleanups, however, a NPDES permit shall be required to authorize any discharges from this site under any circumstances not exempted by CERCLA Section 121 (e)(1).

Effective Date: July 30, 1998

Modification Date: June 11, 1999

William E. McCracken
Chief, Permits Section
Surface Water Quality Division

PART I

Section A. Limitations and Monitoring Requirements

1. Final Effluent Limitations, Monitoring Point 001A

This document authorizes a maximum discharge of five hundred fifty-eight thousand (558,000) gallons per day of treated contaminated groundwater, treated leachate, treated contaminated storm water, and treated sanitary sewage originating onsite through outfall 001, designated as monitoring point 001A, to an unnamed wetland tributary to the Clinton River. Such discharge shall be limited and monitored by the discharger as specified below:

Parameter	Maximum Limits for Quantity or Loading Monthly	Daily	Units	Maximum Limits for Quality or Concentration Monthly	Daily	Units	Frequency of Analysis	Sample Type
INFLUENT MONITORING AND REPORTING								
Benzene	—	—	—	(report)	(report)	mg/l	Weekly	Grab
Ethylbenzene	—	—	—	(report)	(report)	mg/l	Weekly	Grab
Toluene	—	—	—	(report)	(report)	mg/l	Weekly	Grab
Xylenes	—	—	—	(report)	(report)	mg/l	Weekly	Grab
1,2-Dichloroethene	—	—	—	(report)	(report)	mg/l	Weekly	Grab
Vinyl Chloride	—	—	—	(report)	(report)	mg/l	Weekly	Grab
Naphthalene	—	—	—	(report)	(report)	mg/l	Weekly	Grab
DISCHARGE LIMITATIONS, MONITORING AND REPORTING								
Flow	(report)	(report)	MGD	—	—	—	Daily	Report Total Daily Flow
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)								
through July 31, 2000	—	—	—	(report)	10	mg/l	Weekly	24-hour Composit
effective August 1, 2000	—	—	—	4	10	mg/l	Weekly	24-hour Composit
Total Suspended Solids	—	—	—	20	30	mg/l	Weekly	24-hour Composit
Purgeables + Xylenes	—	—	—	—	(report)	ug/l	Weekly	Grab
The Discharger shall analyze for all purgeables + xylenes using U.S. EPA Test Method 624 or approved equivalent. The discharger shall report all Method 624 parameters.					No individual pollutant concentration shall exceed five (5) ug/l as a daily maximum.			
Polynuclear Aromatic Hydrocarbons	—	—	—	—	(report)	ug/l	Weekly	Grab
The Discharger shall analyze for all polynuclear aromatic hydrocarbons using U.S. EPA Test Method 610 or approved equivalent. The discharger shall report all Method 610 parameters. See Part I.A.1.a.					No individual pollutant concentration shall exceed five (5) ug/l as a daily maximum.			
Total Antimony	—	—	—	140	(report)	ug/l	Weekly	24-hour Composit
Total Arsenic	—	—	—	150	(report)	ug/l	Weekly	24-hour Composit
Total Barium								
through July 31, 2000	—	—	—	1300	(report)	ug/l	Weekly	24-hour Composit
effective August 1, 2000	—	—	—	190	(report)	ug/l	Weekly	24-hour Composit
Total Cadmium	—	—	—	9.5	(report)	ug/l	Weekly	24-hour Composit
Hexavalent Chromium	—	—	—	11	32	ug/l	Weekly	24-hour Composit

(continued)

PART I

Section A. Limitations and Monitoring Requirements

Parameter	Maximum Limits for Quantity or Loading Monthly	Daily	Units	Maximum Limits for Quality or Concentration Monthly	Daily	Units	Frequency of Analysis	Sample Type
DISCHARGE LIMITATIONS, MONITORING AND REPORTING (CONTINUED)								
Total Chromium	—	—	—	240	(report)	ug/l	Weekly	24-hour Composite
*Total Cobalt	—	—	—	(report)	(report)	ug/l	Weekly	24-hour Composite
Total Copper	—	—	—	30	98	ug/l	Weekly	24-hour Composite
Total Cyanide	—	—	—	5.2	44	ug/l	Weekly	24-hour Composite
Total Lead	—	—	—	130	(report)	ug/l	Weekly	24-hour Composite
Total Mercury (see Part I.A.1.f.)	—	—	—	0.0013	(report)	ug/l	Weekly	24-hour Composite
Total Nickel	—	—	—	230	(report)	ug/l	Weekly	24-hour Composite
Total Selenium	—	—	—	5	(report)	ug/l	Weekly	24-hour Composite
Total Silver	—	—	—	0.6	(report)	ug/l	Weekly	24-hour Composite
*Total Vanadium	—	—	—	(report)	(report)	ug/l	Weekly	24-hour Composite
Total Zinc	—	—	—	550	1100	ug/l	Weekly	24-hour Composite
Polychlorinated Biphenyls (PCBs) (see Part I.A.1.f.)	—	—	—	0.00002	(report)	ug/l	Weekly	24-hour Composite
2,4-Dimethylphenol	—	—	—	12	160	ug/l	Weekly	Grab
*2-Methylphenol								
through July 31, 2000	—	—	—	(report)	(report)	ug/l	Weekly	Grab
effective August 1, 2000	—	—	—	(report)	5	ug/l	Weekly	Grab
Phenol								
through July 31, 2000	—	—	—	210	(report)	ug/l	Weekly	Grab
effective August 1, 2000	—	—	—	(report)	5	ug/l	Weekly	Grab
Pentachlorophenol	—	—	—	2.8	(report)	ug/l	Weekly	Grab
*Butyl Benzyl Phthalate								
through July 31, 2000	—	—	—	(report)	(report)	ug/l	Weekly	Grab
effective August 1, 2000	—	—	—	(report)	5	ug/l	Weekly	Grab
*Di-n-Butyl Phthalate								
through July 31, 2000	—	—	—	(report)	(report)	ug/l	Weekly	Grab
effective August 1, 2000	—	—	—	(report)	5	ug/l	Weekly	Grab
Bis(2-ethylhexyl) Phthalate								
through July 31, 2000	—	—	—	59	(report)	ug/l	Weekly	Grab
effective August 1, 2000	—	—	—	(report)	5	ug/l	Weekly	Grab
Total DDT (see Part I.A.1.f.)	—	—	—	0.032	(report)	ug/l	Weekly	24-hour Composite
Lindane	—	—	—	0.07	(report)	ug/l	Weekly	24-hour Composite
*Benzo(b)fluoranthene	—	—	—	(report)	5	ug/l	Weekly	Grab
1,2,4-Trichlorobenzene								
through July 31, 2000	—	—	—	30	(report)	ug/l	Weekly	Grab
effective August 1, 2000	—	—	—	(report)	5	ug/l	Weekly	Grab
[illegible]	—	—	—	(report)	(report)	ug/l	Weekly	Grab

PART I

Section A. Limitations and Monitoring Requirements

Parameter	Maximum Limits for Quantity or Loading: Monthly	Daily	Units	Maximum Limits for Quality or Concentration: Monthly	Daily	Units	Frequency of Analysis	Sample Type
DISCHARGE LIMITATIONS, MONITORING AND REPORTING (CONTINUED)								
Total Phosphorus	—	—	—	1.0	—	mg/l	Weekly	24-hour Composit
Fecal Coliform Bacteria	—	—	—	200	400	cts/100ml	Weekly	Grab
Outfall Observation	(report)	—	—	—	—	—	Weekly	Visual
Equipment Inspection	(report)	—	—	—	—	—	3X/Week	Visual
				Minimum Daily	Maximum Daily			
Dissolved Oxygen	—	—	—	4.0	—	mg/l	Monthly	Grab
pH	—	—	—	6.5	9.0	S.U.	Monthly	Grab

*Effluent limits are being developed as toxicological data becomes available for Total Cobalt, Total Vanadium, 2-Methylphenol, Benzo(b)fluoranthene, Bis(2-chloroethyl)ether, Butyl Benzyl Phthalate and Di-n-Butyl Phthalate. This document may be reopened to incorporate effluent limitations, monitoring requirements and other conditions as appropriate.

a. Analytical Testing

Test procedures for the analysis of pollutants shall be United States Environmental Protection Agency approved methods as outlined in 40 CFR Part 136 for all sampling. Analytical quantification levels shall be appropriate for the limitations imposed. Cobalt shall be analyzed using US EPA Method 219.2 with a detection level of 2 ug/l and Vanadium shall be analyzed using US EPA Method 200.7 with a detection level of 10 ug/l. US EPA Method 625 is an approved equivalent test method for anaylsis of US EPA Method 610 parameters if the laboratory performing the analysis can achieve a quantification level of 5 µg/l for those parameters. The analytical results of all scans performed shall be submitted as attachments to the Discharge Monitoring Reports. Equivalent test methods may be used upon approval of the Southeast Michigan District Supervisor of the Surface Water Quality Division.

b. Treatment

This document is based on the discharger providing extended aeration, clarification and tertiary sand filtration treatment. If treatment other than extended aeration, clarification and tertiary sand filtration is proposed, the discharger shall amend the application received on January 27, 1995, as amended through April 27, 1999. The document may then be modified to include additional effluent limitations to protect water quality in accordance with applicable rules and regulations.

c. Narrative Standard

The receiving stream shall contain no unnatural turbidity, color, oil film, floating solids, foams, settleable solids, or deposits as a result of this discharge.

d. Monitoring Locations

Samples, measurements, and observations taken in compliance with the monitoring requirements above shall be taken prior to treatment for all influent monitoring and after treatment but prior to mixing with any other waste stream for all effluent monitoring.

PART I

Section A. Limitations and Monitoring Requirements

e. Monitoring Frequency

Upon initiation of discharge, the influent and the effluent shall be monitored and sampled at the frequency indicated in Part I.A.1. of this document. After six months, and if steady state conditions have been achieved, the discharger may request a reduction in monitoring frequency. This request shall be submitted to the Southeast Michigan District Supervisor of the Surface Water Quality Division. Upon receipt of written approval, the discharger may reduce the monitoring frequency indicated in Part I.A.1. of this document. The monitoring frequency shall not be reduced to less than once per month except for compounds that have been consistently non-detectable in the effluent at the appropriate detection limits, may be reduced to semi-annually. After six months of treatment system operation the discharger may demonstrate to the Southeast Michigan District Supervisor that there is consistent and reliable treatment system operation and may request a reduction in the monitoring frequency for equipment inspection. Upon approval of the Southeast Michigan District Supervisor the monitoring frequency may be reduced to once per week physical site visit and inspection coupled with the installation and operation of remote monitoring equipment.

f. Limits below Quantification Level

The sampling procedures, preservation and handling, and analytical protocol for compliance monitoring for mercury shall be in accordance with EPA Method 245.1 and PCBs and DDT shall be in accordance with EPA Method 608. Quantification levels shall not exceed 0.2 ug/l for mercury, 0.1 ug/l for PCBs and 0.05 ug/l for DDT unless higher levels are appropriate because of sample matrix interference. Other methods may be used upon approval of the Southeast Michigan District Supervisor of the Surface Water Quality Division.

The water quality-based effluent limitations for mercury, PCBs and DDT are less than the level of detection using the specified analytical methods. Any discharge of mercury, PCBs and DDT at or above the level of detection is a specific violation of this document. If all the effluent samples in any monthly reporting period are less than the level of detection, the Michigan Department of Environmental Quality will consider the discharger to be in compliance with the final effluent limitations for these pollutants for that reporting period, provided that the discharger is also in full compliance with the mercury, PCBs and DDT minimization programs set forth in Parts I.A.4. and I.A.5. This paragraph does not authorize the discharge of mercury, PCBs and DDT at levels which are injurious to the designated uses of the waters of the state or which constitute a threat to the public health or welfare. [Total PCBs shall be defined as the sum of Aroclors 1242, 1254, and 1260. In addition, any detected Aroclor-specific measurements shall be reported.]

g. Outfall Observation

Any unusual characteristics of the discharge (i.e., unnatural turbidity, color, oil film, floating solids, foams, settleable solids, or deposits) shall be reported within 24 hours to the Southeast Michigan District Supervisor of the Surface Water Quality Division followed with a written report within five (5) days detailing the findings of the investigation and the steps taken to correct the condition.

PART I

Section A. Limitations and Monitoring Requirements

h. Water Treatment Additives

This document does not authorize the discharge of water additives without approval from the Department. Water additives include any material that is added to water used at the facility or to a wastewater generated by the facility to condition or treat the water. In the event a discharger proposes to discharge water additives, the discharger shall submit a request to the Department for approval. Such requests shall be sent to the Great Lakes and Environmental Assessment Section, Surface Water Quality Division, Department of Environmental Quality, P.O. Box 30273, Lansing, Michigan 48909, with a copy of the request to the Southeast Michigan District Supervisor. Instructions may be obtained via the internet at *http://www.deq.state.mi.us/swq/gleas/docs/wta/wtamemo.htm* to submit a request electronically. Written approval from the Department to discharge such additives at specified levels shall be obtained prior to discharge by the discharger. Additional monitoring and reporting may be required as a condition for the approval to discharge the additive.

A request to discharge water additives shall include all of the following water additive usage and discharge information:

1) Material Safety Data Sheet;
2) the proposed water additive discharge concentration;
3) the discharge frequency (i.e., number of hours per day and number of days per year);
4) the outfall from which the product is to be discharged;
5) the type of removal treatment, if any, that the water additive receives prior to discharge;
6) product function (i.e. microbiocide, flocculant, etc.);
7) a 48-hour LC_{50} or EC_{50} for a North American freshwater planktonic crustacean (either *Ceriodaphnia sp., Daphnia sp., or Simocephalus sp.*); and
8) the results of a toxicity test for one other North American freshwater aquatic species (other than a planktonic crustacean) that meets a minimum requirement of Rule 323.1057(2) of the Water Quality Standards.

Prior to submitting the request, the discharger may contact the Great Lakes and Environmental Assessment Section by telephone at 517-335-4184 or via the internet at *ftp://ftp.deq.state.mi.us/pub/swq/rule57/wta/wtalist.doc* to determine if the Department has the product toxicity data required by items 7) and 8). If the Department has the data, the discharger will not need to submit product toxicity data.

PART I

Section A. Limitations and Monitoring Requirements

2. Wetland Discharge Monitoring Program

As a condition of this document the discharger shall provide assurance that waters moving off of this site as a result of the discharge from Outfall 001 will not contain pollutants at levels injurious to water quality. This condition is intended to provide characterization of the quality of water discharging from the site to the Clinton River floodplain. If, upon review of the analysis, it is determined that any of the pollutants in the discharge require limiting to protect the receiving waters in accordance with applicable water quality standards, this document may then be modified by the Michigan Department of Environmental Quality in accordance with applicable laws and rules. The discharger shall monitor the outlet of mitigative wetland #4, designated as monitoring point MP01, as specified below:

WETLAND DISCHARGE MONITORING AND REPORTING

	Units	Frequency of Analysis	Sample Type
$CBOD_5$	mg/l	2x/Month	24-hour Composite
Total Suspended Solids	mg/l	2x/Month	24-hour Composite
Purgeables + Xylenes The Discharger shall analyze for all purgeables + xylenes using U.S. EPA Test Method 624 or approved equivalent. The discharger shall report all Method 624 parameters.	ug/l	2x/Month	Grab
Polynuclear Aromatic Hydrocarbons The Discharger shall analyze for all polynuclear aromatic pollutants using U.S. EPA Test Method 610 or approved equivalent. The discharger shall report all Method 610 parameters. See Part I.A.2.a.	ug/l	2x/Month	Grab
Total Antimony	ug/l	2x/Month	24-hour Composite
Total Arsenic	ug/l	2x/Month	24-hour Composite
Total Barium	ug/l	2x/Month	24-hour Composite
Total Cadmium	ug/l	2x/Month	24-hour Composite
Hexavalent Chromium	ug/l	2x/Month	24-hour Composite
Total Chromium	ug/l	2x/Month	24-hour Composite
Total Cobalt	ug/l	2x/Month	24-hour Composite
Total Copper	ug/l	2x/Month	24-hour Composite
Total Cyanide	ug/l	2x/Month	24-hour Composite
Total Lead	ug/l	2x/Month	24-hour Composite
Total Mercury (see Part I.A.1.f.)	ug/l	2x/Month	24-hour Composite
Total Nickel	ug/l	2x/Month	24-hour Composite
Total Selenium	ug/l	2x/Month	24-hour Composite
Total Silver	ug/l	2x/Month	24-hour Composite
Total Vanadium	ug/l	2x/Month	24-hour Composite
Total Zinc	ug/l	2x/Month	24-hour Composite

(continued)

PART I

Section A. Limitations and Monitoring Requirements

WETLAND DISCHARGE MONITORING AND REPORTING (CONTINUED)

	Units	Frequency of Analysis	Sample Type
Polychlorinated Biphenyls (PCBs)	ug/l	2x/Month	24-hour Composite
2,4-Dimethylphenol	ug/l	2x/Month	Grab
2-Methylphenol	ug/l	2x/Month	Grab
Phenol	ug/l	2x/Month	Grab
Pentachlorophenol	ug/l	2x/Month	Grab
Butyl Benzyl Phthalate	ug/l	2x/Month	Grab
Di-n-Butyl Phthalate	ug/l	2x/Month	Grab
Bis(2-ethylhexyl) Phthalate	ug/l	2x/Month	Grab
Total DDT	ug/l	2x/Month	24-hour Composite
Lindane	ug/l	2x/Month	24-hour Composite
Benzo(b)fluoranthene	ug/l	2x/Month	Grab
1,2,4-Trichlorobenzene	ug/l	2x/Month	Grab
Bis(2-Chloroethyl) ether	ug/l	2x/Month	Grab
Total Phosphorus	mg/l	2x/Month	24-hour Composite
Dissolved Oxygen	mg/l	2x/Month	Grab
pH	S.U.	2x/Month	Grab

a. Analytical Testing
Test procedures for the analysis of pollutants shall be United States Environmental Protection Agency approved methods as outlined in 40 CFR Part 136 for all sampling. Analytical quantification levels shall be as specified in Part I.A.1. US EPA Method 625 is an approved equivalent test method for anaylsis of US EPA Method 610 parameters if the laboratory performing the analysis can achieve a quantification level of 5 µg/l for those parameters. The analytical results of all scans performed shall be submitted as attachments to the Discharge Monitoring Reports. Equivalent test methods may be used upon approval of the Southeast Michigan District Supervisor of the Surface Water Quality Division.

b. Monitoring Location
Samples, measurements, and observations taken in compliance with the monitoring requirements above shall be taken at the outlet culvert of mitigative wetland #4, designated as monitoring point MP01.

c. Monitoring Frequency
Upon initiation of treatment plant operations and discharge through outfall 001, two samples shall be collected every month. After 12 months, and if steady state conditions have been achieved, the discharger may request a reduction in monitoring frequency. This request shall be submitted to the Southeast Michigan District Supervisor of the Surface Water Quality Division. Upon receipt of written approval, the discharger may reduce the monitoring frequency indicated in Part I.A.2. of this document. The monitoring frequency shall not be reduced to less than once per month except compounds that have been consistently non-detectable in the effluent at the appropriate quantification levels, may be reduced to quarterly.

PART I

Section A. Limitations and Monitoring Requirements

3. Chronic Toxicity Testing, Outfall 001

The discharger shall conduct chronic toxicity tests on each of two (2) test species once every two (2) months for a total of eight (8) tests (four on each species). The initial test shall be performed using effluent collected within 48 hours of system start up. Additional tests shall be conducted once every three (3) months for the life of this document. Test species shall include fathead minnow and *Ceriodaphnia dubia*. Testing and reporting procedures shall follow procedures contained in EPA/600/4-91/002, "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", for fathead minnow and *Ceriodaphnia dubia*. Acute toxicity and chronic toxicity data shall be included in the reporting of the toxicity test results. Toxicity test data acceptability is contingent upon the validation of the test method by the testing laboratory. Such validation shall be submitted to the Department upon request. The final report on the tests shall be submitted to the Southeast Michigan District Supervisor of the Surface Water Quality Division within 30 days after completion of the final test.

a. If the result of any one (1) test exceeds 1.0 acute toxic unit (TU_A) or 1.75 chronic toxic unit (TU_C), the following requirements apply:

   1) the discharger shall immediately terminate the discharge from outfall 001 and notify the Southeast Michigan District Supervisor in writing of this action. A report on the toxicity test shall be included with the notification; and

   2) at least 14 days prior to resuming discharge, the discharger shall notify the Southeast Michigan District Supervisor that adequate measures have been taken and the toxicity requirements of Rule 323.1219 of the Michigan Administrative Code can be consistently achieved for outfall 001. Upon resuming the discharge, the discharger shall conduct monthly chronic toxicity tests on final effluent from outfall 001 for three (3) months, then quarterly for the life of this document.

b. If the result of any one (1) test exceeds 1.0 TU_C but is less than or equal to 1.75 TU_C, the following requirements apply: The discharger shall conduct a Toxicity Identification/Reduction Evaluation (TI/RE). The objective of the TI/RE shall be to reduce the toxicity of the final effluent from outfall 001 to less than or equal to 1.0 TU_C within six months. The following documents are available as guidance to reduce toxicity to acceptable levels: Phase I, EPA/600/6-91/005F (chronic), EPA/600/6-91/003 (acute), Phase II, EPA/600/R-92/080, Phase III, EPA/600/R-92/081.

c. The tests shall be conducted and reported as specified above. Upon approval of the Southeast Michigan District Supervisor, the chronic toxicity tests may be performed using the more sensitive species identified in the chronic toxicity database. If a more sensitive species cannot be identified, the chronic toxicity tests shall be performed with both species.

d. This document may be modified in accordance with applicable rules and regulations to include additional whole effluent toxicity control requirements as necessary.

4. Mercury and PCBs Minimization Program

Prior to initiating a discharge, the discharger shall provide a demonstration that the mercury and PCBs monthly average limits will be met at the point of discharge. This demonstration may be accomplished through direct analytical measurement of the influent and/or effluent, a demonstration of the mercury and PCBs removal efficiencies for the treatment system, or another method approved by the Southeast Michigan District Supervisor of the Surface Water Quality Division. Prior to conducting a demonstration, a plan shall be submitted to the Southeast Michigan District Supervisor. Upon receipt of written approval from the Southeast Michigan District Supervisor, the discharger shall conduct the demonstration. After satisfactory demonstration that the mercury and PCBs monthly average limits will be met and upon receipt of written approval from the Southeast Michigan District Supervisor, the discharge from outfall 001 is authorized subject to the limits and conditions of this document.

PART I

Section A. Limitations and Monitoring Requirements

5. DDT Minimization Program

Within 60 days of the effective date of this document, the discharger shall provide a demonstration that the DDT monthly average limit will be met at the point of discharge. This demonstration may be accomplished through direct analytical measurement of the influent and/or effluent, a demonstration of the DDT removal efficiency for the treatment system, or another method approved by the Southeast Michigan District Supervisor of the Surface Water Quality Division. Prior to conducting a demonstration, a plan shall be submitted to the Southeast Michigan District Supervisor. Upon receipt of written approval from the Southeast Michigan District Supervisor, the discharger shall conduct the demonstration. After satisfactory demonstration that the DDT monthly average limit will be met and upon receipt of written approval from the Southeast Michigan District Supervisor, the continued discharge from outfall 001 is authorized subject to the limits and conditions of this document. If the discharger cannot satisfactorily demonstrate that the DDT monthly average limit will be met at the point of discharge, the discharge may be terminated at the discretion of the Southeast Michigan District Supervisor until the discharger can satisfactorily demonstrate that the DDT monthly average limit will be met at the point of discharge. If the initial demonstration that the DDT monthly average limit will be met at the point of discharge is unsuccessful and the Southeast Michigan District Supervisor allows the discharge to continue, a schedule to bring the discharge into compliance with the DDT monthly average limit shall be determined by the Southeast Michigan District Supervisor.

6. Discharge to the Groundwaters

This site is a known source of groundwater pollution. The issuance of this document does not authorize any discharge to the groundwaters or venting of contaminated groundwaters to the surface waters, nor does it constitute a release of liability for any groundwater contamination at or around the site. The state reserves its rights to seek remedies to abate any groundwater contamination.

7. Short Term Waste Characterization Study

As a condition of this document, the discharger shall monitor the discharge from outfall 001 for the constituents as specified below. Sample frequency shall be weekly for twelve (12) weeks after treatment system startup followed by quarterly samples for the life of this document. Quarterly samples shall be taken in January, April, July and October. The results of the analysis of such monitoring shall be attached to the regular monthly discharge monitoring reports. If, upon review of the analysis, it is determined that any of the materials or constituents require limiting to protect the receiving waters in accordance with applicable water quality standards, the document may then be modified by the Michigan Department of Environmental Quality in accordance with applicable rules and regulations.

Parameter	Sample Type	Analytical Method	Quantification Level (ug/l)
d-BHC	24-hour Composite	US EPA Method 608	0.01
Acetone	Grab	US EPA Method 624	50
2-Butanone	Grab	US EPA Method 624	50
Carbon Disulfide	Grab	US EPA Method 624	5
2-Hexanone	Grab	US EPA Method 624	50
4-Methyl-2-Pentanone	Grab	US EPA Method 624	50
Vinyl Acetate	Grab	US EPA Method 624	5
4-Methylphenol	Grab	US EPA Method 625	20
N-Nitrosodiphenylamine	Grab	US EPA Method 625	5
4-Chloroaniline	Grab	US EPA Method 625	20
3-Nitroaniline	Grab	US EPA Method 625	20
4-Nitroaniline	Grab	US EPA Method 625	20
Benzoic Acid	Grab	US EPA Method 625	50
Dibenzofuran	Grab	US EPA Method 625	5
2-Methylnaphthalene	Grab	US EPA Method 625	5
Total Beryllium	24-hour Composite	US EPA Method 200.7	1.0
Total Boron	24-hour Composite	US EPA Method 200.7	20
Total Thallium	24-hour Composite	US EPA Method 279.2	2.0
Total Tin	24-hour Composite	US EPA Method 282.2	5

(continued)

PART I

Section A. Limitations and Monitoring Requirements

Parameter	Sample Type	Analytical Method	Quantification Level (ppq)*
		Chlorinated Dibenzo-p-dioxin Congeners	
2,3,7,8-TCDD	Grab	US EPA Method 1613	10
1,2,3,7,8-PeCDD	Grab	US EPA Method 1613	50
1,2,3,4,7,8-HxCDD	Grab	US EPA Method 1613	50
1,2,3,6,7,8-HxCDD	Grab	US EPA Method 1613	50
1,2,3,7,8,9-HxCDD	Grab	US EPA Method 1613	50
1,2,3,4,6,7,8-HpCDD	Grab	US EPA Method 1613	50
OCDD	Grab	US EPA Method 1613	100
Chlorinated Dibenzofuran Congeners			
2,3,7,8-TCDF	Grab	US EPA Method 1613	10
1,2,3,7,8-PeCDF	Grab	US EPA Method 1613	50
2,3,4,7,8-PeCDF	Grab	US EPA Method 1613	50
1,2,3,4,7,8-HxCDF	Grab	US EPA Method 1613	50
1,2,3,6,7,8,-HxCDF	Grab	US EPA Method 1613	50
2,3,4,6,7,8-HxCDF	Grab	US EPA Method 1613	50
1,2,3,7,8,9- HxCDF	Grab	US EPA Method 1613	50
1,2,3,4,6,7,8-HpCDF	Grab	US EPA Method 1613	50
1,2,3,4,7,8,9-HpCDF	Grab	US EPA Method 1613	50
OCDF	Grab	US EPA Method 1613	100

*ppq=parts per quadrillion

In addition to the above monitoring requirements, the discharger shall perform GC/MS scans weekly for twelve (12) weeks on grab samples from outfall 001 immediately after system start up and then quarterly for the life of this document. Quarterly samples shall be taken in January, April, July and October. The GC/MS analysis shall identify any EPA priority pollutants present that are not included in the list above and any other identified or significant unidentified peaks. For each identified peak, an order-of-magnitude estimate of the concentration shall be provided based on comparison with an existing internal standard. For any significant unidentified peaks, the discharger shall attempt to identify the compound and estimate the concentration associated with these peaks. The task of peak identification and concentration estimate shall be performed in accordance with the best professional judgment of an experienced GC/MS analyst. A significant unidentified peak shall be considered to be any peak that produces a peak response signal to background noise ratio of 25:1 or greater.

Analysis shall be by the test methods specified in Part I.A.7. or alternate methods approved by the Southeast Michigan District Supervisor of the Surface Water Quality Division. Staff of the Michigan Department of Environmental Quality shall be provided the opportunity to split samples upon request. The analytical results shall be submitted as attachments to the Discharge Monitoring Reports.

PART II

Section A. Definitions

This list of definitions may include terms not applicable to this document.

Acute toxic unit (TU_a) means $100/LC_{50}$ where the LC_{50} is determined from a whole effluent toxicity (WET) test which produces a result that is statistically or graphically estimated to be lethal to 50% of the test organisms.

Bioaccumulative chemical of concern (BCC) means a chemical which, upon entering the surface waters, by itself or as its toxic transformation product, accumulates in aquatic organisms by a human health bioaccumulation factor of more than 1000 after considering metabolism and other physiochemical properties that might enhance or inhibit bioaccumulation. The human health bioaccumulation factor shall be derived according to R 323.1057(5). Chemicals with half-lives of less than 8 weeks in the water column, sediment, and biota are not BCCs. The minimum bioaccumulation concentration factor (BAF) information needed to define an organic chemical as a BCC is either a field-measured BAF or a BAF derived using the biota-sediment accumulation factor (BSAF) methodology. The minimum BAF information needed to define an inorganic chemical as a BCC, including an organometal, is either a field-measured BAF or a laboratory-measured bioconcentration factor (BCF). The BCCs to which these rules apply are identified in Table 5 of R 323.1057 of the Water Quality Standards.

Chronic toxic unit (TU_c) means 100/MATC or $100/IC_{25}$, where the maximum acceptable toxicant concentration (MATC) and IC_{25} are expressed as a percent effluent in the test medium.

Daily concentration *is the sum of the concentrations of the individual samples of a parameter divided by the number of* samples taken during any calendar day. If the parameter concentration in any sample is less than the quantification limit, regard that value as zero when calculating the daily concentration. The daily concentration will be used to determine compliance with any maximum and minimum daily concentration limitations (except for pH and dissolved oxygen). When required by the document, report the maximum calculated daily concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the Discharge Monitoring Reports (DMRs).

For pH, report the maximum value of any individual sample taken during the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs and the minimum value of any individual sample taken during the month in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs. For dissolved oxygen, report the minimum concentration of any individual sample in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Daily loading is the total discharge by weight of a parameter discharged during any calendar day. This value is calculated by multiplying the daily concentration by the total daily flow and by the appropriate conversion factor. The daily loading will be used to determine compliance with any maximum daily loading limitations. When required by the document, report the maximum calculated daily loading for the month in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMRs.

Department means the Michigan Department of Environmental Quality.

Detection Level means the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level of probability.

District Supervisor: The Southeast Michigan District Supervisor of the Surface Water Quality Division is located at the Southeast Michigan District Office-DEQ, Surface Water Quality Division, 38980 Seven Mile Road, Livonia, Michigan 48152-1006, telephone: 734-953-8905 (fax: 734-953-1467).

Division of Health Facility Services – Health Facility Evaluation Section, Michigan Department of Consumer and Industry Services mailing address is P.O. Box 30195, Lansing, Michigan 48909.

Drinking Water and Radiological Protection Division – Environmental Health, Michigan Department of Environmental Quality mailing address is P.O. Box 30630, Lansing, Michigan 48909-8130.

EC_{50} means a statistically or graphically estimated concentration that is expected to cause 1 or more specified effects in 50% of a group of organisms under specified conditions.

PART II

Section A. Definitions

Fecal coliform bacteria monthly is the geometric mean of the samples collected in a calendar month (or 30 consecutive days). The calculated monthly value will be used to determine compliance with the maximum monthly fecal coliform bacteria limitations. When required by the document, report the calculated monthly value in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMRs.

Fecal coliform bacteria 7-day is the geometric mean of the samples collected in any 7-day period. The calculated 7-day value will be used to determine compliance with the maximum 7-day fecal coliform bacteria limitations. When required by the document, report the maximum calculated 7-day concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Flow Proportioned sample is a composite sample with the sample volume proportional to the effluent flow.

Grab sample is a single sample taken at neither a set time nor flow.

IC_{25} means the toxicant concentration that would cause a 25% reduction in a nonquantal biological measurements for the test population.

Interference is a discharge which, alone or in conjunction with a discharge or discharges from other sources, both:
1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
2) therefore, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or, of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act. [This definition does not apply to sample matrix interference.]

LC_{50} means a statistically or graphically estimated concentration that is expected to be lethal to 50% of a group of organisms under specified conditions.

Maximum acceptable toxicant concentration (MATC) means the concentration obtained by calculating the geometric mean of the lower and upper chronic limits from a chronic test. A lower chronic limit is the highest tested concentration that did not cause the occurrence of a specific adverse effect. An upper chronic limit is the lowest tested concentration which did cause the occurrence of a specific adverse effect and above which all tested concentrations caused such an occurrence.

Monthly concentration is the sum of the daily concentrations determined during a reporting month (or 30 consecutive days) divided by the number of daily concentrations determined. The calculated monthly concentration will be used to determine compliance with any maximum monthly concentration limitations. When required by the document, report the calculated monthly concentration in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMRs.

For minimum percent removal requirements, the monthly influent concentration and the monthly effluent concentration shall be determined. The calculated monthly percent removal, which is equal to 100 times the quantity [1 minus the quantity (monthly effluent concentration divided by the monthly influent concentration)], shall be reported in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Monthly loading is the sum of the daily loadings of a parameter divided by the number of daily loadings determined in the reporting month (or 30 consecutive days). The calculated monthly loading will be used to determine compliance with any maximum monthly loading limitations. When required by the document, report the calculated monthly loading in the "AVERAGE" column under "QUANTITY OR LOADING" on the DMRs.

National Pretreatment Standards are the regulations promulgated by or to be promulgated by the Federal Environmental Protection Agency pursuant to Section 307(b) and (c) of the Federal Act. The standards establish nationwide limits for specific industrial categories for discharge to a POTW.

PART II

Section A. Definitions

NOAEL means the highest tested dose or concentration of a substance that results in no observed adverse effect in exposed test organisms where higher doses or concentrations result in an adverse effect.

Noncontact Cooling Water is water used for cooling which does not come into direct contact with any raw material, intermediate product, by-product, waste product or finished product.

Nondomestic user is any discharger to a POTW that discharges wastes other than or in addition to water-carried wastes from toilet, kitchen, laundry, bathing or other facilities used for household purposes.

Pretreatment is reducing the amount of pollutants, eliminating pollutants, or altering the nature of pollutant properties to a less harmful state prior to discharge into a public sewer. The reduction or alteration can be by physical, chemical, or biological processes, process changes, or by other means. Dilution is not considered pretreatment unless expressly authorized by an applicable National Pretreatment Standard for a particular industrial category.

POTW is a publicly owned treatment works.

Quantification level means the measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calculated at a specified concentration above the detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.

Regional Administrator is the Region 5 Administrator, U.S. EPA, located at R-19J, 77 W. Jackson Blvd., Chicago, Illinois 60604.

7-day concentration is the sum of the daily concentrations determined during any 7 consecutive days in a reporting month divided by the number of daily concentrations determined. The calculated 7-day concentration will be used to determine compliance with any maximum 7-day concentration limitations. When required by the document, report the maximum calculated 7-day concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

7-day loading is the sum of the daily loadings of a parameter divided by the number of daily loadings determined during any 7 consecutive days in a reporting month. The calculated 7-day loading will be used to determine compliance with any maximum 7-day loading limitations. When required by the document, report the maximum calculated 7-day loading for the month in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMRs.

Significant industrial user is a nondomestic user that: 1) is subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; or 2) discharges an average of 25,000 gallons per day or more of process wastewater to a POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up five (5) percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the discharger as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's treatment plant operation or violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Tier I value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier I toxicity data base.

Tier II value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier II toxicity data base.

Toxicity Reduction Evaluation (TRE) means a site-specific study conducted in a stepwise process designed to identify the causative agents of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

Water Quality Standards means the Part 4 Water Quality Standards developed under Part 31 of Act No. 451 of the Public Acts of 1994, as amended, being Rules 323.1041 through 323.1117 of the Michigan Administrative Code.

PART II

Section A. Definitions

3-Portion Composite sample is a sample consisting of three equal volume grab samples collected at equal intervals over an 8-hour period.

24-Hour Composite sample is a flow proportioned composite sample consisting of hourly or more frequent portions that are taken over a 24-hour period.

PART II

Section B. Monitoring Procedures

1. Representative Samples

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations promulgated pursuant to Section 304(h) of the Federal Act (40 CFR Part 136 - Guidelines Establishing Test Procedures for the Analysis of Pollutants). For parameters not specified in the document or covered by the regulations, test procedures shall be submitted for approval to the Southeast Michigan District Supervisor of the Surface Water Quality Division.

The discharger shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the discharger's laboratory Quality Control/Quality Assurance program.

3. Instrumentation

The discharger shall periodically calibrate and perform maintenance procedures on all monitoring instrumentation at intervals to ensure accuracy of measurements.

4. Recording Results

For each measurement or sample taken pursuant to the requirements of this document, the discharger shall record the following information: 1) the exact place, date, and time of measurement or sampling; 2) the person(s) who performed the measurement or sample collection; 3) the dates the analyses were performed; 4) the person(s) who performed the analyses; 5) the analytical techniques or methods used; 6) the date of and person responsible for equipment calibration; and 7) the results of all required analyses.

5. Records Retention

All records and information resulting from the monitoring activities required by this document including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the Michigan Department of Environmental Quality.

PART II

Section C. Reporting Requirements

1. Start-up Notification

If the discharger will not discharge during the first 60 days following the effective date of this document, the discharger shall notify the Southeast Michigan District Supervisor of the Surface Water Quality Division within 14 days, and then 60 days prior to the commencement of the discharge.

2. Submittal Requirements for Self-Monitoring Data

Unless instructed on the effluent limits page to conduct "retained self-monitoring", the discharger shall submit self-monitoring data on the Environmental Protection Agency's Discharge Monitoring Report (DMR) forms (monthly summary information) and the Department's Daily Discharge Monitoring Report forms (daily information) to PCS-Data Entry, Surface Water Quality Division, Michigan Department of Environmental Quality, P.O. Box 30273, Lansing, Michigan, 48909-7773, for each calendar month of the authorized discharge period(s). The forms shall be postmarked no later than the 10th day of the month following each month of the authorized discharge period(s).

Alternative Daily Discharge Monitoring Report formats may be used if they provide equivalent reporting details and are approved by the Southeast Michigan District Supervisor of the Surface Water Quality Division. For information on electronic submittal of this information, contact the Southeast Michigan District Supervisor.

3. Retained Self-Monitoring Requirements

If instructed on the effluent limits page to conduct retained self-monitoring, the discharger shall maintain a year-to-date log of retained self-monitoring results and, upon request, provide such log for inspection to the staff of the Surface Water Quality Division, Michigan Department of Environmental Quality (in the case of mobile home parks, campgrounds, marinas and schools, to the staff of the Drinking Water and Radiological Protection Division -- Environmental Health, Michigan Department of Environmental Quality, or, in the case of hospitals, nursing homes and extended care facilities, to the staff of the Division of Health Facility Services -- Health Facility Evaluation Section, Michigan Department of Consumer and Industry Services). Retained self-monitoring results are public information and shall be promptly provided to the public upon request.

The discharger shall certify, in writing, to the Southeast Michigan District Supervisor of the Surface Water Quality Division, on or before January 10th of each year, that: 1) all retained self-monitoring requirements have been complied with and a year-to-date log has been maintained; and 2) the application on which this document is based still accurately describes the discharge.

4. Additional Monitoring by Permittee

If the discharger monitors any pollutant at the location(s) designated herein more frequently than required by this document, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report. Such increased frequency shall also be indicated.

Monitoring required pursuant to Part 41 of the Michigan Act or Rule 35 of the Mobile Home Park Commission Act (Act 96 of the Public Acts of 1987) for assurance of proper facility operation shall be submitted as required by the Department.

5. Compliance Dates Notification

Within 14 days of every compliance date specified in this document, the discharger shall submit a written notification to the Southeast Michigan District Supervisor of the Surface Water Quality Division indicating whether or not the particular requirement was accomplished. If the requirement was not accomplished, the notification shall include an explanation of the failure to accomplish the requirement, actions taken or planned by the discharger to correct the situation, and an estimate of when the requirement will be accomplished. If a written report is required to be submitted by a specified date and the discharger accomplishes this, a separate written notification is not required.

PART II

Section C. Reporting Requirements

6. Noncompliance Notification

Compliance with all requirements set forth in the Federal Act, Parts 31 and 41 of the Michigan Act, and related regulations and rules is required. All instances of noncompliance shall be reported as follows:

a. 24-hour reporting - Any noncompliance which may endanger health or the environment (including maximum daily concentration discharge limitation exceedances) shall be reported, verbally, within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days.

b. other reporting - The discharger shall report, in writing, all other instances of noncompliance not described in a. above at the time monitoring reports are submitted; or, in the case of retained self-monitoring, within five (5) days from the time the discharger becomes aware of the noncompliance.

Written reporting shall include: 1) a description of the discharge and cause of noncompliance; and 2) the period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and the steps taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

7. Spill Notification

The discharger shall immediately report any spill or loss of any product, by-product, intermediate product, oils, solvents, waste material, or any other polluting substance which occurs to the surface waters or groundwaters of the state by calling the Southeast Michigan District Supervisor of the Surface Water Quality Division at 734-953-8905, or if the notice is provided after regular working hours call the Department of Environmental Quality's 24-hour Emergency Response telephone number, 1-800-292-4706 (calls from out-of-state dial 1-517-373-7660); and within ten (10) days of the spill or loss, the discharger shall submit to the Southeast Michigan District Supervisor of the Surface Water Quality Division a full written explanation as to the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken, and schedule of implementation.

8. Upset Noncompliance Notification

If a process "upset" (defined as an exceptional incident in which there is unintentional and temporary noncompliance with technology based document effluent limitations because of factors beyond the reasonable control of the discharger) has occurred, the discharger who wishes to establish the affirmative defense of upset, shall notify the Southeast Michigan District Supervisor of the Surface Water Quality Division by telephone within 24-hours of becoming aware of such conditions; and within five (5) days, provide in writing, the following information:

a. that an upset occurred and that the discharger can identify the specific cause(s) of the upset;

b. that the permitted wastewater treatment facility was, at the time, being properly operated; and

c. that the discharger has specified and taken action on all responsible steps to minimize or correct any adverse impact in the environment resulting from noncompliance with this document.

In any enforcement proceedings, the discharger, seeking to establish the occurrence of an upset, has the burden of proof.

PART II

Section C. Reporting Requirements

9. Bypass Prohibition and Notification

a. Bypass Prohibition - Bypass or diversion of treatment facilities for groundwater remediations is prohibited. For discharges other than groundwater remediations, bypass is prohibited unless:

1) bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

2) there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass; and

3) the discharger submitted notices as required under 9.b. or 9.c. below.

b. Notice of Anticipated Bypass - If the discharger knows in advance of the need for a bypass, it shall submit prior notice to the Southeast Michigan District Supervisor of the Surface Water Quality Division, if possible at least ten days before the date of the bypass, and provide information about the anticipated bypass as required by the Southeast Michigan District Supervisor. The Southeast Michigan District Supervisor may approve an anticipated bypass, after considering its adverse effects, if it will meet the three conditions listed in 0.a. above.

c. Notice of Unanticipated Bypass - The discharger shall submit notice to the Southeast Michigan District Supervisor of the Surface Water Quality Division of an unanticipated bypass by telephone at 734-953-8905 (if the notice is provided after regular working hours, use the following number: 1-800-292-4706) as soon as possible, but no later than 24 hours from the time the discharger becomes aware of the circumstances.

d. Written Report of Bypass - A written submission shall be provided within five (5) working days of commencing any bypass to the Southeast Michigan District Supervisor of the Surface Water Quality Division, and at additional times as directed by the Southeast Michigan District Supervisor. The written submission shall contain a description of the bypass and its cause; the period of bypass, including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass; and other information as required by the Southeast Michigan District Supervisor.

e. Bypass Not Exceeding Limitations - The discharger may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of 9.a., 9.b., 9.c., and 9.d., above. This provision does not relieve the discharger of any notification responsibilities under Part II.C.10. of this document.

f. Definitions

1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

PART II

Section C. Reporting Requirements

10. Notification of Changes in Discharge

The discharger shall notify the Southeast Michigan District Supervisor of the Surface Water Quality Division, in writing, within 10 days of knowing, or having reason to believe, that any activity or change has occurred or will occur which would result in the discharge of: 1) detectable levels of chemicals on the current Michigan Critical Materials Register, priority pollutants or hazardous substances set forth in 40 CFR 122.21, Appendix D, or the Pollutants of Initial Focus in the Great Lakes Water Quality Initiative specified in 40 CFR 132.6, Table 6, which were not acknowledged in the application or listed in the application at less than detectable levels; 2) detectable levels of any other chemical not listed in the application or listed at less than detection, for which the application specifically requested information; or 3) any chemical at levels greater than five times the average level reported in the complete application submitted on January 27, 1995, as amended through April 27, 1999. Any other monitoring results obtained as a requirement of this document shall be reported in accordance with the compliance schedules.

11. Changes in Facility Operations

Any anticipated action or activity, including but not limited to facility expansion, production increases, or process modification, which will result in new or increased loadings of pollutants to the receiving waters must be reported to the Southeast Michigan District Supervisor of the Surface Water Quality Division by a) submission of an increased use request (application) and all information required under Rule 323.1098 (Antidegradation) of the Water Quality Standards or b) by notice if the following conditions are met: 1) the action or activity will not result in a change in the types of wastewater discharged or result in a greater quantity of wastewater than currently authorized by this document; 2) the action or activity will not result in violations of the effluent limitations specified in this document; 3) the action or activity is not prohibited by the requirements of Part II.C.12.; and 4) the action or activity will not require notification pursuant to Part II.C.10. Following such notice, the document may be modified according to applicable laws and rules to specify and limit any pollutant not previously limited.

12. Bioaccumulative Chemicals of Concern (BCC)

Consistent with the requirements of Rules 323.1098 and 323.1215 of the Michigan Administrative Code, the discharger is prohibited from undertaking any action that would result in a lowering of water quality from an increased loading of a BCC unless an increased use request and antidegradation demonstration have been submitted and approved by the Department.

13. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the discharger shall notify the succeeding owner or controller of the existence of this document by letter, a copy of which shall be forwarded to the Southeast Michigan District Supervisor of the Surface Water Quality Division 30 days prior to the actual transfer of ownership or control.

PART II

Section D. Management Responsibilities

1. Duty to Comply

All discharges authorized herein shall be consistent with the terms and conditions of this document. The discharge of any pollutant identified in this document more frequently than or at a level in excess of that authorized shall constitute a violation of the document.

It is the duty of the discharger to comply with all the terms and conditions of this document. Any noncompliance with the Effluent Limitations, Special Conditions, or terms of this document constitutes a violation of the Michigan Act and/or the Federal Act and constitutes grounds for enforcement action; for document termination, revocation and reissuance, or modification; or denial of an application for document renewal.

2. Operator Certification

The discharger shall have the waste treatment facilities under direct supervision of an operator certified at the appropriate level for the facility certification by the Michigan Department of Environmental Quality, as required by Sections 3110 and 4104 of the Michigan Act.

3. Facilities Operation

The discharger shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the discharger to achieve compliance with the terms and conditions of this document. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures.

4. Power Failures

In order to maintain compliance with the effluent limitations of this document and prevent unauthorized discharges, the discharger shall either:

a. provide an alternative power source sufficient to operate facilities utilized by the discharger to maintain compliance with the effluent limitations and conditions of this document; or

b. upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the discharger to maintain compliance with the effluent limitations and conditions of this document, the discharger shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this document.

5. Adverse Impact

The discharger shall take all reasonable steps to minimize any adverse impact to the surface waters or groundwaters of the state resulting from noncompliance with any effluent limitation specified in this document including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the discharge in noncompliance.

6. Containment Facilities

The discharger shall provide facilities for containment of any accidental losses of concentrated solutions, acids, alkalies, salts, oils, or other polluting materials in accordance with the requirements of the Part 5 Rules (Rules 323.1151 through 323.1169 of the Michigan Administrative Code). For a POTW, these facilities shall be approved under Part 41 of the Michigan Act.

PART II

Section D. Management Responsibilities

7. Waste Treatment Residues

Residuals, i.e. solids, sludges, biosolids, filter backwash, scrubber water, ash, grit or other pollutants removed from or resulting from treatment or control of wastewaters, shall be disposed of in an environmentally compatible manner and according to applicable laws and rules. These laws may include, but are not limited to, the Michigan Act, Part 31 for protection of water resources, Part 55 for air pollution control, Part 111 for hazardous waste management, Part 115 for solid waste management, Part 121 for liquid industrial wastes, Part 301 for protection of inland lakes and streams, and Part 303 for wetlands protection. Such disposal shall not result in any unlawful pollution of the air, surface waters or groundwaters of the state.

8. Right of Entry

The discharger shall allow the Michigan Department of Environmental Quality, any agent appointed by the Department or the Regional Administrator, upon the presentation of credentials:

a. to enter upon the discharger's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this document; and

b. at reasonable times to have access to and copy any records required to be kept under the terms and conditions of this document; to inspect process facilities, treatment works, monitoring methods and equipment regulated or required under this document; and to sample any discharge of pollutants.

9. Availability of Reports

Except for data determined to be confidential under Section 308 of the Federal Act and Rule 2128 (Rule 323.2128 of the Michigan Administrative Code), all reports prepared in accordance with the terms of this document shall be available for public inspection at the offices of the Department and the Regional Administrator. As required by the Federal Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Act and Sections 3112, 3115, 4106 and 4110 of the Michigan Act.

PART II

Section E. Activities Not Authorized by This Permit

1. Discharge to the Groundwaters

This document does not authorize any discharge to the groundwaters. Such discharge may be authorized by a groundwater discharge permit issued pursuant to the Michigan Act.

2. Facility Construction

This document does not authorize or approve the construction or modification of any physical structures or facilities. Approval for such construction for a POTW must be by permit issued under Part 41 of the Michigan Act. Approval for such construction for a mobile home park, campground or marina shall be from the Drinking Water and Radiological Protection Division – Environmental Health, Michigan Department of Environmental Quality. Approval for such construction for a hospital, nursing home or extended care facility shall be from the Division of Health Facility Services – Health Facility Evaluation Section, Michigan Department of Consumer and Industry Services upon request.

3. Civil and Criminal Liability

Except as provided in document conditions on "Bypass" (Part II.C.9.) pursuant to 40 CFR 122.41(m)), nothing in this document shall be construed to relieve the discharger from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond his control, such as accidents, equipment breakdowns, or labor disputes.

4. Oil and Hazardous Substance Liability

Nothing in this document shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger may be subject under Section 311 of the Federal Act except as are exempted by federal regulations.

5. State Laws

Nothing in this document shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Federal Act.

6. Property Rights

The issuance of this document does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits or approvals from other units of government as may be required by law.

APPENDIX C

SET POINTS/MISCELLANEOUS PROGRAMMING

TABLE C.1

REMOTE MONITORING AND CONTROL VIA pcANYWERE™

The SCADA computer system at the facility can be accessed by a remotely located PC computer via modem and pcANYWERE™ software. The procedure for accessing the SCADA computer is as follows:

1. Dial the SCADA computer system modem phone number (1-810-323-7945) through pcANYWERE™.

2. Log in Name: OPERATOR.

3. Password: GHLANDFILL.

4. Wonderware™ Log in Name: OPERATOR or ENGINEER

5. Wonderware™ Password: OPERATOR or ENGINEER
(ENGINEER has privilege of changing set points).

TABLE C.2

VERBATIM™ AUTODIALER PHONE NUMBER PROGRAMMING

The Verbatim™ Autodialer is programmed with the following phone numbers:

Phone Number Designation	*Use Program Code*	*Phone Number*	*Person*
01	701	1-616-630-7327	Dave Jaeger's Pager
02	702	1-810-758-4859	Dave Jaeger's Home
03	703	1-616-630-7327	Dave Jaeger's Pager
04	704	1-616-630-7682	Steve Papai's Pager
05	705	1-616-207-3394	Bart Bartholomy

Phone Number Programming

01	701	1-616-630-7327##########323-7941*8#5
03	703	1-616-630-7327##########323-7941*8#5
04	704	1-616-630-7682##########323-7941*8#5
05	705	1-616-207-3394-323-7941*8#5

TABLE C.7

SUMP ELEVATION DATA
GROUNDWATER/LEACHATE TREATMENT FACILITY
G && H LANDFILL SITE, MACOMB COUNTY, MI

Sump No.	*Hatch Frame*	*Sump Rim*	*Sump Base*	*Sump Depth (ft)*	*Depth Transmitter*	*Ball Float (low shut-off)*	*Pump Inlet*	*Pump Off*	*Pump On*
					Elevations (ft AMSL)				
Phase III Toe Drain									
S-1	680.90	676.52	661.65	14.87	662.15	663.15	662.63	663.65	665.65
S-2	672.21	668.65	652.04	16.61	652.38	653.38	652.88	653.88	655.88
S-3	672.30	668.64	652.46	16.18	652.63	653.63	653.13	654.13	656.13
Watermain Drain									
S-4	698.95	694.49	671.62	22.87	672.03	673.03	672.53	673.53	675.53
S-5	699.86	694.36	670.53	23.83	671.19	672.19	671.65	672.69	674.69
Leachate Collection System									
S-6	697.20	693.74	671.35	22.39	674.91	675.91	675.41	-	-
S-*	697.89	692.72	668.06	24.66	671.56	672.56	672.06	-	-
S-8	692.16	688.24	665.62	22.62	669.24	670.24	669.74	-	-
S-9	693.94	688.52	665.69	22.83	669.27	670.27	669.77	-	-
S-10		690.36	669.61	20.75	673.61	674.61	674.11	-	-
Groundwater Collection System									
WW4	690.53	684.95	671.69	18.83	672.78	673.78	671.80	-	-

Notes:

* - Sump S-7 installed on approximate 22° angle from vertical.

** - Subject to verification.

TABLE C.3

SWITCH SET POINTS
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Tag#	*Description*	*Units*	*Accuracy*	*Range*	*Set Point*
TSHA221	Blower - Temperature Switch	deg.F	-	-	235
TSHA222	Blower - Temperature Switch	deg.F	-	-	235
TSHA223	Blower - Temperature Switch	deg.F	-	-	235
PSH221	Blower - Pressure Switch	psi	-	-	6.5
PSH222	Blower - Pressure Switch	psi	-	-	6.5
PSH223	Blower - Pressure Switch	psi	-	-	6.5
PSH321	Backwash - Pressure Switch	psi	-	-	5.5
PSH322	Backwash - Pressure Switch	psi	-	-	5.5
PSL350	Air Compressor - Pressure Switch	psi	-	-	40
-	Potable Water - Control Pressure Switch	psi	-	-	30-40
-	Potable Water - Monitor Pressure Switch	psi	-	-	25
-	Non-Potable - Control Pressure Switch	psi	-	-	40-60
-	Non-Potable - Monitor Pressure Switch	psi	-	-	25
TSH368	Building Temperature - Thermostat High	deg.F	-	-	100
TSL368	Building Temperature - Thermostat Low	deg.F	-	-	40

TABLE C.4

INSTRUMENT RANGE SUMMARY
GOUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Tag#	*Description*	*Units*	*Accuracy*	*Range*	*Low Level Set Point*	*High Level Set Point*	*Preset Level Low Range*	*Preset Level High Range*
FIT-110	Forcemain #1 Flow Meter	gpm	1	0-25	-	-	-	-
FIT-120	Forcemain #2 Flow Meter	gpm	1	0-135	-	-	-	-
FIT-130	Forcemain #3 Flow Meter	gpm	1	0-135	-	-	-	-
FIT-140	Forcemain #4 Flow Meter	gpm	1	0-135	-	-	-	-
FIT-150	Forcemain #5 Flow Meter	gpm	-	-	-	-	-	-
FIT-160	Forcemain #6 Flow Meter	gpm	-	-	-	-	-	-
TIT-212	Mix Tank Temperature	deg.F	1	32-100	-	-	-	-
FIT-225	Blower Air Flow	SCFM	1	0-200	-	140	-	-
FIT-275	RAS Flow Meter	gpm	1	0-620	-	-	-	-
AIT-254	Filter Effluent Turbidity	ntu	0.01	0-100	-	-	-	-
AIT-281	Clarifier Effluent Turbidity	ntu	0.01	0-10,000	-	-	-	-
AIT-251A	Aeration Basin #1 Dissolved Oxygen	mg/L	0.1	0-10	1	6	1-3	2.5-6
AIT-251B	Aeration Basin #1 pH	pH	0.1	0-14	-	-	-	-
TIT-251	Aeration Basin #1 Temperature	deg.F	1	32-75	-	-	-	-
AIT-252A	Aeration Basin #2 Dissolved Oxygen	mg/L	0.1	0-10	1	6	1-3	2.5-6
AT-252B	Aeration Basin #2 pH	pH	0.1	0-14	-	-	-	-
TIT-252	Aeration Basin #2 Temperature	deg.F	1	32-75	-	-	-	-
AIT-253A	Aeration Basin #3 Dissolved Oxygen	mg/L	0.1	0-10	1	6	1-3	2.5-6
AT-253B	Aeration Basin #3 pH	pH	0.1	0-14	-	-	-	-
TIT-253	Aeration Basin #3 Temperature	deg.F	1	32-75	-	-	-	-
LIT-329	Mudwell Level	ft	0.1	0-10	2	9.17	2-5	2-8.5
LIT-330	Sludge Storage #1 Level	ft	0.1	0-10	2	9.1	1.5-4	4-8.5
LIT-335	Sludge Storage #2 Level	ft	0.1	0-10	2	9.1	1.5-4	4-8.5
FIT-324	Backwash Flow Meter	gpm	1	0-620	-	-	-	-
LIT-320	Clearwell Level	ft	0.1	0-10	2.25	-	2.25-3	-
FIT-347	Sludge Flow Meter	gpm	0.1	0-12	1.5	-	-	-
PT-110	Water Level (663-680)	ft	0.1	0-23.1	663.25	665.25	-	-
PT-115	Water Level (653-672)	ft	0.1	0-23.1	653.25	655.25	-	-
PT-120	Water Level (653-672)	ft	0.1	0-23.1	653.25	655.25	-	-
PT-125	Water Level (673.5-697)	ft	0.1	0-23.1	674	676	-	-
PT-130	Water Level (673.5-697)	ft	0.1	0-23.1	674	676	-	-
PT-135	Water Level	ft	0.1	-	677	684	-	-
PT-140	Water Level	ft	0.1	-	676	683	-	-
PT-145	Water Level	ft	0.1	-	673	680	-	-
PT-150	Water Level	ft	0.1	-	673	680	-	-
PT-155	Water Level	ft	0.1	-	676	683	-	-
PT-185	Water Level	ft	0.1	-	673	685	-	-

TABLE C.5

SCADA SET POINT SUMMARY
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Tag#	*Description*	*Units*	*Accuracy*	*Range*	*Low Level Set Point*	*High Level Set Point*	*Preset Level Low Range*	*Preset Level High Range*
-	Mudwell Air Mixing Timer Setpoint	min	1	-			0-30	-
-	Sludge Wasting Interval	hrs	-	-	1	24	-	-
-	Sludge Wasting Duration	min	-	-	100	2400	-	-
-	H2O2 Manual Feed Pump Input	%	-	0-100	-	-	-	-
-	H3P04 Manual Feed Pump Input	%	-	0-100	-	-	-	-
-	Alcohol Manual Feed Pump Input	%	-	0-100	-	-	-	-
-	Aluminum Manual Feed Pump Input	%	-	0-100	-	-	-	-
-	Polymer Manual Feed Pump Input	%	-	0-100	-	-	-	-
-	Filter Bed #1 Extended Timer Preset	hrs	-	-	-	-	12	30
-	Filter Bed #2 Extended Timer Preset	hrs	-	-	-	-	12	30
-	Filter Bed #3 Extended Timer Preset	hrs	-	-	-	-	12	30
-	Filter Bed #4 Extended Timer Preset	hrs	-	-	-	-	12	30
-	Effluent Turbidity High Level Preset	ntu	-	-	-	-	-	0-10
-	Air Scour Timer Preset	min	-	-	-	-	2	6
-	Backwash Timer Preset	min	-	-	5	15	-	-
-	Filter Bed #1 Air Scour Delay Preset	min	-	-	0.5	3	-	-
-	Sump #1 Preset	ft	-	-	663.25	-	-	-
-	Sump #2 Preset	ft	-	-	653.25	-	-	-
-	Sump #3 Preset	ft	-	-	653.25	-	-	-
-	Sump #4 Preset	ft	-	-	674	-	-	-
-	Sump #5 Preset	ft	-	-	674	-	-	-
-	Blower #1 Shutdown Timer Preset	sec	-	-	30	60	-	-
-	Blower #2 Shutdown Timer Preset	sec	-	-	30	60	-	-
-	Blower #3 Shutdown Timer Preset	sec	-	-	30	60	-	-
FIT-275	RAS Flow Meter	gpm	1	0-620	-	-	-	-
AIT-254	Filters Effluent Turbidity	ntu	0.01	0-100	-	-	-	-
AIT-281	Clarifier Effluent Turbidity	ntu	0.01	0-10,000	-	-	-	-
AIT-251A	Aeration Basin #1 Dissolved Oxygen	mg/L	0.1	0-10	1	6	1-3	2.5-6
AIT-252A	Aeration Basin #2 Dissolved Oxygen	mg/L	0.1	0-10	1	6	1-3	2.5-6
AIT-253A	Aeration Basin #3 Dissolved Oxygen	mg/L	0.1	0-10	1	6	1-3	2.5-6
LIT-329	Mudwell Level	ft	0.1	0-10	2	9.17	2-5	8.5
LIT-330	Sludge Storage #1 Level	ft	0.1	0-10	2	9.1	1.5-4	4-8.5
LIT-335	Sludge Storage #2 Level	ft	0.1	0-10	2	9.1	1.5-4	4-8.5
PT-110	Water Level (663-680)	ft	0.1	0-23.1	663.25	665.25	-	-
PT-115	Water Level (653-672)	ft	0.1	0-23.1	653.25	655.25	-	-
PT-120	Water Level (653-672)	ft	0.1	0-23.1	653.25	655.25	-	-
PT-125	Water Level (673.5-697)	ft	0.1	0-23.1	674	676	-	-
PT-130	Water Level (673.5-697)	ft	0.1	0-23.1	674	676	-	-

TABLE C.6

FLOAT SET POINT SUMMARY
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Tag#	*Description*	*Units*	*Low Level Set Point*	*High Level Set Point*
LSHH260	Building Sump	ft	-	1.5*
LSHH330	Sludge Storage Tanks	ft	691.75	8.75*
LSHH335	Sludge Storage Tanks	ft	691.75	8.75*
LSHH329	Mudwell	ft	691.75	8.75*
LSL300	Filters	ft	-	7.5*
LSL305	Filters	ft	-	7.5*
LSL310	Filters	ft	-	7.5*
LSL315	Filters	ft	-	7.5*
LSH300	Filters	ft	692.5	9.5*
LSH305	Filters	ft	692.5	9.5*
LSH310	Filters	ft	692.5	9.5*
LSH315	Filters	ft	692.5	9.5*
LSL320	Clearwell	ft	685	2*
LSL320A	Clearwell	ft	685	2*
LSHH320	Clearwell	ft	690	7*
LSL290	Scum Tank	ft	685.5	2.5*
LSH290	Scum Tank	ft	689	6*
LSHH290	Scum Tank	ft	690	7*

*Height above base of tank.

APPENDIX D

CONTACT LIST

TABLE D.1

CONTACT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Equipment	*Manufacturer*	*Supplier*	*Contact Name*	*Phone Number*
Air Compressor	Air Center	Air Center	Karen Licari	810-619-7800
Air Dryer	Air Center	Air Center	Karen Licari	810-619-7800
Air Mass Flow Meter	Fluid Components	I&C Sales	Vince Lowley	313-283-6150
Autodialer	RACO	Instrument Sales	Bob Carmicael	317-773-2752
Automatic Sampler	American Sigma	Peterson & Matz	Dale Bently	248-476-3204
Backwash Pumps	ITT-AC	Robinson Supply Kennedy Industries	Fred Opie Bob Hoffer	317-849-0611 248-684-1200
Centrifugal Blowers	Detroit Air	Detroit Air	Dennis Wise	248-544-2982
Chemical Feed Pumps	Aldos	RS Tech Services	Rod Parks	616-897-7041
Clarifier	Envirex	Envirex	Jim Kowalski	414-521-8456
Dissolved Oxygen System	Great Lakes	Utilities Inst. Inc.	Jerry Walls	313-482-1450
Flow Meters	B. Fisher-Porter	B. Fisher-Porter	Ray Ehl	317-882-3752
Flow Control Valve	Golden Anderson	Hamlet Engr. Sales	Brent G.	248-778-0806
Gas Detection System	MSA	MSA	Don Hackmeister	815-871-2815
Generator Set	Williams Detroit Diesel	Williams Detroit Diesel	Stan Rokita	313-584-6150

TABLE D.1

CONTACT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Equipment	*Manufacturer*	*Supplier*	*Contact Name*	*Phone Number*
Level Transmitters	Milltronics	Burke Sales	John Dolan	313-697-9230
Motor Control Center	Allen Bradley	Webb Electric	Ned Chika	248-553-6935
Mudwell Pumps	ITT-AC	Robinson Supply Kennedy Industries	Fred Opie Bob Hoffer	317-849-0611 248-684-1200
Oil/Water Separators	Facet International	Facet International	Warren Monger	313-207-2414
pH Analyzers	Great Lakes	Utilities Inst. Inc.	Jerry Walls	313-482-1450
PLC Programming	Apex Control Specialists	Apex Control Specialists	Brian Dardeen	812-838-0148
Pressure Sys Pump	ITT-AC	Robinson Supply Kennedy Industries	Fred Opie Bob Hoffer	317-849-0611 248-684-1200
Pressure Transmitters	Druck	RDP Corp	Chris/Cliff	248-471-0685
RAS Pumps	ITT-AC	Robinson Supply Kennedy Industries	Fred Opie Bob Hoffer	317-849-0611 248-684-1200
SCADA Programming	Apex Control Specialists	Apex Control Specialists	Blair Bremer Brian Dardeen	812-838-0148
Scum Pump	Wemco	Dubois/Cooper	Jim Cooper	313-455-6700
Sludge Pumps	Moyno	Robinson Supply	Fred Opie	317-849-0611

TABLE D.1

CONTACT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Equipment	*Manufacturer*	*Supplier*	*Contact Name*	*Phone Number*
		Kennedy Industries	Bob Hoffer	248-684-1200
Turbidity Meters	HACH	HACH	Jeff Kulow	970-669-3050
Wet Well Pumps	EPG Sure Pump	Pumps Plus	Matt Prosoli	248-888-9004
Computer Equipment	Aggressive Systems Inc.	Aggressive Systems Inc.	Bob Bernat	248-477-5300

APPENDIX E

SUPPLIERS LIST

TABLE E.1

SUPPLIERS LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

Product / Service	*Supplier*	*Account Number*	*Contact Name*	*Phone Number*	*Fax Number*
Analytical	Tri-Matrix Analytical Service		Lisa Harvey	616-975-4532	
Chemicals	Van Waters & Rogers	DT414958	Julie Wireman (Customer Service) Warren Schnieder (Sales Rep)	419-666-7880	419-666-6819
Diesel Fuel	Shelby Oil		Mike Monieati	313-731-7676	810-999-3250
Electricity	Detroit Edison		John D. Hendriks	810-412-3074	
Lab Equipment	HACH	258-063	Jim Huntley	800-227-4224	
Garbage Collection	Browning-Ferris Industries		www.bfi.com	800-858-0089	
Potable Water	Oxford Water Transport		Jeffery Harrison	248-628-4471	
Telephone	Ameritec	810-323-7937	www.ameritech.com	800-244-4444	

APPENDIX F

EQUIPMENT LIST

TABLE F.1

EQUIPMENT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

COMPUTER EQUIPMENT

LOCAL

Computer:	DELL Dimensions XPS M233S
Monitor:	Serial No.: 66746-J7PX8-28
Processor:	Serial No.: DPMPT
	Model: MMS
Printer:	Fujitsu DL3800
Part No.:	CA02312-F203 / Date: 1998-3
Serial No.:	VT434983
UPS:	MGE UPS Systems Pulsar EX15
ART:	5103227300 / NT: A1
SER:	537740066
Modem:	U.S. Robotics
Part No.:	1.020.091-B
Serial No.:	21PS28M7JDRH
SYQUEST	1.5 Gig hardrive
Part No.:	34002
Serial No.:	002200175548

REMOTE

Computer:	DELL Dimensions XPS M233S
Monitor:	Serial No.: 66746-J7PLS-28
Processor:	Serial No.: DPMPP
	Model: MMS
Printer:	Fujitsu DL3800
Part No.:	CA02312-B202
Serial No.:	VT434947 / Date: 1998-3
Modem:	U.S. Robotics
Part No.:	1.020.091-B
Serial No.:	21PS28M7JDQD

COPIER/SCANNER/FAX/PRINTER

	Hewlett Packard Office Jet 500
Part No.:	C4641A
Option:	ABA
Serial No.:	SG7COB80HQ

SOFTWARE

	Rockwell WINtelligent Logic 5
Order No.:	RWR778-A1 0001
Catalog No.:	9323WL 5300D
Serial No.:	WL5-26075 Version 3.23.09
Registered to:	Aggressive Systems 04/15/98
http://	www.software.rockwell.com

PROGRAMMABLE LOGIC CONTROL

	Allen-Bradley
	PLC-5/40
	Allen-Bradley
	Remote I/O Adapter
Catalog No.:	1771-ASB E
Serial No.:	SD1FS8KA
Cards:	ANALOG IN (12 BIT)
	ANALOG OUT (12BIT)
	AC INPUT
	AC OUTPUT
	Allen-Bradley
	1771-P4S
Spare Cards:	17711AD D (x2)
	1771OAD C (x2)
	1771OFE2 B (x2)
	1771IFE C (x2)

TABLE F.1

EQUIPMENT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

FLOW METERS

	Forcemain 1	Forcemain 2	Forcemain 3
FLOW METER			
Tag No.:	FIT-110	FIT-120	FIT-130
Model No.:	10DX3111ADE11P1E2LK21321	10DX3111ADE12P1E3LK21321	10DX3111ADE12P1E3LK21321
Serial No.:	97W017343	97W017345	97W017346
Liner:	Teflon	Teflon	Teflon
Electrode:	Zircon	Zircon	Zircon
Max. Press.:	285 PSIG	285 PSIG	285 PSIG
Size:	1.5"	2"	2"
MTR CAP:	158.5 GPM	264.2 GPM	264.2 GPM
Submerge to:	33	33	33
DETAILS:	Bailey Fisher Porter	Bailey Fisher Porter	Bailey Fisher Porter
CONVERTER:			
Model No.:	10DX3111ADE11P1E2LK21321	10DX3111AD12P1E3LK21321	10DX3111AD12P1E3LK21321
Serial. No.:	97W017344	97W017347	97W017348
For use with:	43	45	46
DETAILS:	0-25 GPM	0-135 GPM	0-135 GPM

	Forcemain 4	Forcemain 5	Forcemain 6
FLOW METER			
Tag No.:	FIT-140	FIT-150	FIT-160
Model No.:	10DX3111ADE14P1E3LK21321	10DX3111ADE14P1E3LK21321	10DX3111ADE14P1E3LK21321
Serial No.:	97W017349	97W017351	97W017350
Liner:	Teflon	Teflon	Teflon
Electrode:	Zircon	Zircon	Zircon
Max. Press.:	285 PSIG	285 PSIG	285 PSIG
Size:	3"	3"	3"
MTR CAP:	792.5 GPM	792.5 GPM	792.5 GPM
Submerge to.	33	33	33
DETAILS:	Bailey Fisher Porter	Bailey Fisher Porter	Bailey Fisher Porter
CONVERTER:			
Model No.:	50XM13NXKD10AABC229	50XM13NXKD10AABC229	50XM13NXKD10AABC229
Serial. No.:	97W017348	97W017353	97W017354
For use with:	46	50	51
DETAILS:	0-135 GPM	0-135 GPM	0-135 GPM

	SLUDGE DISPOSAL	BACKWASH	RAS
FLOW METER			
Tag No.:	FIT-347	FIT-324	FIT-275
Model No.:	10DX3111ADE09P1E2LK21321	10DX3111ADE17P1E3LK31321	10DX 311ADE17P1E3LK21321
Serial No.:	97W017341	97W017356	97W017355
Liner:	Teflon	Teflon	Teflon
Electrode:	Zircon	Zircon	Zircon
Max. Press.:	285 PSIG	285 PSIG @40C Max 130C	285 PSIG @40C Max 130C
Size:	1"	6" SPGRI	6" SPGRI
MTR CAP:	52.83 GPM	2642 GPM at 7.5 Hz Conv. 50XM	2642 GPM at 7.5 Hz Conv. 50XM
Submerge to:	33	33	33
DETAILS:	Bailey Fisher Porter	Bailey Fisher Porter	Bailey Fisher Porter
CONVERTER:			
Model No.:	50XM13NXKD10AABC229	50XM13NXKD10AABC229	50XM13NXKD10AABC229
Serial. No.:	97W017342	97W017357	97W017358
For use with:	41	for use with 97W17355	for use with 97W17356
DETAILS:	0-12 GPM	Supply L/N 120V 60Hz 23 VA Max Output: 4 to 20 mm for 0 to 620 GPM	Supply L/N 120V 60Hz 23 VA Max Output: 4 to 20 mm for 0 to 620 GPM

AIR MASS

Tag No.:	FIT-226
Brand name:	Fluid Components International
Model:	AF88-0BC/A02BBE1
Serial No.:	169403

TABLE F.1

EQUIPMENT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

PUMPS

	RAS PUMPS		BACKWASH PUMPS		NON-POTABLE WATER PUMP	SCUM PUMP
PUMP						
Tag No.:	M-4	M-5	M-15	M-16	M-14	M-8
	ITT A-C PUMP	ITT A-C PUMP	ITT A-C PUMP	ITT A-C PUMP	ITT A-C PUMP	Wemco - Hydrostal. Pump
Size:	4x4x12 LC	4x4x12 LC	6x6x9.5	6x6x9.5	2x1.5x6.5	-
Type:	NSWV	NSWV	2000	2000	2000	-
Serial Number:	97-216986-01-02	97-216986-01-01	AC-216986-0101	AC-216986-0102	AC-216986-0301	96X 14421
GPM:	620	620	580	580	42	125
Head (ft):	37	37	26	26	135	32
RPM:	1165	1165	1200	1200	3500	1750
Model:	350	350	150	150	150	D3K-S-DOW
Imp. Diam.:	10.62	10.62	9	9	6	-
I.D. No.:	-	-	QF2627	QF2627	QF2632	-
Year:	1997	1997	6-97	6-97	6-97	6-97
Frame No.:	F7M3	F7M3	500	500	330	-
Part No.:	-	-	AC5226	AC5226	AC5225	-
Inb. Brg.:	U-1311-B	U-1311-B	AC0551	AC0551	AC0550	-
Out. Brg.:	5389	5389	AC0551	AC0551	AC0550	-
DETAILS:	field press.: 75psi	field press.: 75psi				
MOTOR						
Brand name:	U.S. Motor	U.S. Motor	GE	U.S.Electrical	GE	Reliance Electric
Model:	H 14728	H 14728	5K254BC305	A917A	5K184BC8A	-
Stock No.:	-	-	5333	-	K193	-
Serial No.:	-	-	LGH16C413024	-	3720640041	-
I.D. No.:	-	-	-	A02Z348R019F	-	P18F311 XY
Horsepower:	10	10	7.5	7.5	5	3
Phase:	3	3	3	3	3	3
Hertz:	60	60	60	60	60	60
RPM:	1170	1170	1165	1165	3450	1715
Frame:	256 VP	256 VP	254T	254T	184T	182T
Type:	TVE	TVE	K	UT	K193	P
Code:	-	-	H	G	J	J
Encl:	TE	TE	TE	TE	TE	TEFC
S.F.:	1.15	1.15	1.15	1.25	1.15	1.15
Rating:	Inverter Duty	Inverter Duty	Cont.	Cont.	Cont.	-
Volts:	460	460	230/460	208-230/460	230/460	230/460
Amps:	12.7	12.7	20/10	22.2-20.2/10.1	12.6/6.3	8.9/4.45
Ins. Class:	F	F	F	F	F	F
NEMA Design.:	B	B	B	B	C	B
Max. Amb.:	40°C	40°C	40°C	40°C	40°C	40°C
Shaft End Bearing:	6310-2Z-JC3	6310-2Z-JC3	6309Z2	6309-2Z-JC3	6306-22	30BCO3XPP30X26
NEMA Nom. Eff.:	88.5	88.5	85.5	87.5	81.5	81.5
Opp. End Brg:	6207-2Z-JC3	6207-2Z-JC3	6307-2Z-XLC	6207-2Z-JC3	6306-22	30BCO2XPP30X26

TABLE F.1

EQUIPMENT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

PUMPS

MUDWELL PUMPS

PUMP		
Tag No.:	M-6	M-7
	ITT A-C PUMP	ITT A-C PUMP
Size:	3x2x11	3x2x11
Type:	2000	2000
Serial Number:	AC-216986-0201	AC-216986-0202
GPM:	60	60
Head (ft):	42	42
RPM:	1200	1200
Model:	150	150
Imp. Diam.:	10.1	10.1
I.D. No.:	QF2628	QF2628
Year:	6-97	6-97
Frame No.:	330	330
Part No.:	AC5225	AC5225
Inb. Brg.:	AC0550	AC0550
Out. Brg.:	AC0550	AC0550
MOTOR		
Brand name:	GE	U.S. Electric
Model:	5KE215BC305 H	A909A
Stock No.:	-	-
Serial No.:	MHH181036003	A04A037R055B
I.D. No.:	-	-
Horsepower:	5	5
Phase:	3	3
Hertz:	60	60
RPM:	1155	1165
Frame:	215T	215T
Type:	KE	UT
Code:	J	J
Encl:	TE	TE
S.F.:	1.15	1.25
Rating:	Cont.	Cont
Volts:	230/460	208-230/460
Amps:	13.4/6.7	17.4-16.0/8.0
Ins. Class:	F	F
NEMA Design.:	B	B
Max. Amb.:	40°C	40°C
Shaft End Bearing:	63082Z	6208-2Z-J/C3
NEMA Nom. Eff.:	87.5	85.5
Opp. End Brg:	63062Z	6206-2Z-J/C3
DETAILS:	Max. KVAR: 2.5	
	Power factor: 80.5	
	Weight: 165 lbs.	
	No.: S241	

POTABLE WATER PUMP

PUMP	
Tag No.:	
	ITT A-C PUMP
Size:	2x1.5x9
Type:	2000
Serial Number:	AC-246744-0101
Head (ft):	
RPM:	1800
Model:	500
Imp. Diam.:	8.3
Year:	6-98
MOTOR	
Brand name:	US Motor
Model:	FR 1453JP
I.D. No.:	B0597057082 001 F
Horsepower:	2
Phase:	3
RPM:	1735
Type:	FUTI
Code:	L
Encl:	TE
S.F.:	1.25
Rating:	Cont.
Volts:	208-230/460
Amps:	6.1-5.9/2.9
Ins. Class:	F
NEMA Design.:	B
Max. Amb.:	40°C
Shaft End Bearing	6206-2Z-J/C3
NEMA Nom. Eff.:	84
Opp. End Brg:	6203-2Z-J/C3
DETAILS:	Max. KVAR: 1.2
	Power factor: 75.9
	Guaranteed eff.: 81.5
	S.F. amps: 6.9/3.5

SLUDGE HANDLING PUMPS

PUMP		
Tag No.:	M-30	M-31
Brand name:	MONYO	MONYO
Type:	BID CDQ3 SAA	BID CDQ3 SAA
S.O.:	AS2124496-2 ZE	AS2124496-1 ZE
IN:	97121C114-02	97121C114-01
OUT:	21F-1401C	21F-1401C
Torque:	3.09	3.09
Ratio:	549 in-lbs	549 in-lbs
Service Factor:	566 RPM	566 RPM
Mounting Position	B5	B5
MOTOR		
	Reliance Electric D-C Motor	Electric D-C Motor
S.O.:	T56S2014A	T56S2014A
Code:	1.5	1.5
Horsepower:	1750	1750
RPM:	TPR	TPR
Type:	TEFC	TEFC
Hz:	Cont.	Cont.
Volts:	180	180
Amps:	7	7
Ins. Class:		
Max. Amb.:	40°C	40°C
Conn. Diam.:		
Duty:		
Design:	FR LF0056HCZ	FR LF0056HCZ
S.F.:	FLD: PM	FLD: PM
	Max. Safe Speed: 5500	Safe Speed: 5500
	Max. Allow. Peak Amps: 53	ow. Peak Amps: 53
	Form factor: 1.31	Form factor: 1.31
	02/97 BRUSH 0430A	/97 BRUSH 0430A

TABLE F.1

EQUIPMENT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

	CHEMICAL FEED PUMPS					
	H_2O_2 #1	H_2O_2 #2	ALUM	ALCOHOL	PHOSPHORUS	POLYMER
PUMP						
Tag No.:						
Brand name:	Aldos	Aldos	Aldos	Aldos	Aldos	Aldos
Model No.:	252-11A51/D61/R01/V80	252-11A51/D61/R01/V80	251-5A50/V80	251-5A50/V80	251-5A50/V80	252-11-A50/V80
Serial Number:	97/00124	97/00125	97/00077	97/00079	97/00078	97/00082
DETAILS:						11 litres/h 10 bar 50 Hz
MOTOR						
Brand name:	BALDOR	BALDOR	BALDOR	BALDOR	BALDOR	BALDOR
Cat. No.:	CDP3320	CDP3320	CDP3320	CDP3320	CDP3320	CDP3320
Spec.:	33-2024Z102	33-2024Z102	33-2024Z102	33-2024Z102	33-2024Z102	-
Horsepower:	0.33	0.33	0.33	0.33	0.33	0.33
RPM:	1750	1750	1750	1750	1750	1750
Type:	PM3327P	PM3327P	PM3327P	PM3327P	PM3327P	PM3327P
Serial Number:	W597	W597	W597	W597	W597	W597
Volts:	90	90	90	90	90	90
Amps:	3.2	3.2	3.2	3.2	3.2	3.2
Ins. Class:	F	F	F	F	F	F
Max. Amb.:	40°C	40°C	40°C	40°C	40°C	40°C
Frame:	56C	56C	56C	56C	56C	56C
Duty:	Cont.	Cont.	Cont.	Cont.	Cont.	Cont.
Encl.:	TENV	TENV	TENV	TENV	TENV	TENV
Supply:	F.F.1.30	F.F.1.30	F.F.1.30	F.F.1.30	F.F.1.30	P.F.1.30
Brg. /DE:	6203	6203	6203	6203	6203	6203
Brg. /ODE:	6203	6203	6203	6203	6203	6203
Brush:	2/BP5011T01	2/BP5011T01	2/BP5011T01	2/BP5011T01	2/BP5011T01	2/BP5011T01

TABLE F.1

EQUIPMENT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

		BLOWERS		
		BLOWER 1	**BLOWER 2**	**BLOWER 3**
Tag No.:		M-1	M-2	M-3
	Brand name			
INLET FILTERS	Stoddard			
Model:		F65-6	F65-6	F65-6
Part No.:		45018	45018	45018
S.O. No.:		97-162K	97-162K	97-162K
BLOWER	Lamson			
Model:		519-0-9-AD	519-0-9-AD	519-0-9-AD
Part No.:		970387	970388	970389
S.O. No.:		67251	67251	67251
H.P.		40	40	40
MOTOR	Baldor			
Spec.:		40H070W919G1	40H070W919G1	40H070W919G1
Frame:		286TS	286TS	286TS
Ser.		09704	09704	09704
H.P.		40 DP	40 DP	40 DP
Volt.:		460	460	460
Amp.:		50	50	50
RPM:		3525	3525	3525
Hz:		60	60	60
Ser. F.		1.15	1.15	1.15
Phase:		3	3	3
Des.:		B	B	B
Class:		B	B	B
Code:		F	F	F
NEMA Nom. Eff.:		90.20%	90.20%	90.20%
P.F.		83%	83%	83%
Rating:		40 °C Amb. Cont.	40 °C Amb. Cont.	40 °C Amb. Cont.
BEARING				
- Front		6309	6309	6309
- Pulley		6311	6311	6311
SILENCER	Stoddard			
Model No.:		C23-6	C23-6	C23-6
Part No.:		87003	87003	87003
S.O. No.:		97-403M	97-403M	97-403M

TABLE F.1

EQUIPMENT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

PUMPS

	CLARIFIER		PHILADELPHIA MIXER
PUMP		PUMP	
Tag No.:	M-10	Tag No.:	M-32
Brand name:	Sew Eurodrive Inc.	Serial Number:	97AAB048o
Model No.:	R60DT71D4-KS	Ratio:	1-1
I.D. No.:	850008694.97.97001	Size Type:	PD-13
Serial Number:	1700 RPM	Input RPM:	1750
S.K.:	9 RPM	Output RPM:	1750
Ratio:	1696 lb-in	S.F.:	1-Jan
Max. Torque:	190.84	Order No.:	20075
Opp. Speed:	1.25		
MNT Pos.:	B3		
DETAILS:			
MOTOR		MOTOR	
Brand name:		Brand name:	Reliance
I.D. No.:	850008694.97.97001	I.D. No.:	C56S 53241-Y2 FR EB56C
Horsepower:	N	Horsepower:	0.33
RPM:	0.5	RPM:	1725
Type:	1700	Type:	CS
Encl:	DFT71D4-KS	Rating:	Cont.
Rating:	60	Volts:	115/230
Volts:	230YY/460Y	Amps:	6.4/3.2
Amps:	2.15/1.07	Ins. Class:	F
Ins. Class:	F	Max. Amb.:	40°C
Max. Amb.:	40°C	Hz:	60
Shaft End Bearing:	DT79	Code:	M
Opp. End Brg:	Cont.	Phase:	1
DETAILS:	B	S.F.:	1.15
	1.15		

OIL/WATER SEPARATORS

	1	2
Manufacturer:	Facet Intl.	Facet Intl.
Model:	MCS-23	MCS-23
Serial No.:	F4262-2	F4262-1
DETAILS:	506 GPM	506 GPM
	1997	1997

DIESEL GEN SET

Tag No.:	
Brand name:	pectrum Detroit Diesel
Model:	300DS
Serial No.:	387905
Spec.:	PA-191274
Service Duty:	Stand-by
RPM:	1800
Hz:	60

TABLE F.1

EQUIPMENT LIST
GROUNDWATER/LEACHATE TREATMENT FACILITY
G & H LANDFILL SITE

MEASUREMENT INSTRUMENTS

	BASIN 1	BASIN 2	BASIN 3
Dissolved Oxygen			
Tag No.:	AIT251A	AIT252A	AIT253A
Brand name:	Great Lakes Instruments	Great Lakes Instruments	Great Lakes Instruments
Model:	D63H1N1A1A1N, D.O., Model 63	D63H1N1A1A1N, D.O., Model 63	D63H1N1A1A1N, D.O., Model 63
Serial No.:	97031274	97031234	97031272
Encl.:	NEMA 4X	NEMA 4X	NEMA 4X
Input:	100 to 275 V Ac	100 to 275 V Ac	100 to 275 V Ac
DETAILS:	50/60 Hz	50/60 Hz	50/60 Hz
	20 VA	20 VA	20 VA
pH/Temperature			
Tag No.:	AT251B/251	AT252B/252	AT253B/253
Brand name:	Great Lakes Instruments	Great Lakes Instruments	Great Lakes Instruments
Model:	P63A1N1A1A1N, pH, LO-Z, Model 63	P63A1N1A1A1N	P63A1N1A1A1N
Serial No.:	97011073	97031044	97031041
Encl.:	NEMA 4X	NEMA 4X	NEMA 4X
Input:	100 to 275 V Ac	100 to 275 V Ac	100 to 275 V Ac
DETAILS:	50/60 Hz	50/60 Hz	50/60 Hz
	20 VA	20 VA	20 VA

MIX TANK TEMPERATURE TRANSMITTER

Tag No.:	TIT212
Brand name:	Rosemount
Model:	444RL1U2B1NA
Serial No.:	544816
SPAN:	25/T5C
Cal.:	32 to 100°F
Sensor Input:	100 ohm RTD

HACH SURFACE SCATTER 6

	DISPLAY
Tag No.:	AIT281
Model No.:	
Part No.:	45000-12 (part of 45000-10)
Serial No.:	970400003165
DETAILS:	115/230 V
	50/60 Hz
	0.5/0.3A
	SENSOR
Part No.:	45000-02 (part of 45000-10)
Serial No.:	970400003165

LEVEL SENSORS

Tag No.:	LIT329 - MUD WELL
	LIT320 - CLEAR WELL
	LIT330 - SLUDGE TANK #1
	LIT335 - SLUDGE TANK #2
Brand name:	Miltronics Multiranger Plus
Quantity:	4
Range:	0.3 to 8.0 m
Accuracy:	0.25 percent of range

GAS DETECTION SYSTEM

Tag No.:	
Brand name:	
Model:	MSA Inc.
Serial No.:	Series 5300
Test For:	Methane Gas
Cal.:	
Sensor 1:	AE360A in electrical room
Sensor 2:	AE360B in sludge tank
Quantitiy:	

HACH 1720C LOW RANGE TUBIDIMETER

Tag No.:	AIT254
Model No.:	
Part No.:	44000-10
Serial No.:	970400017500
DETAILS:	115/230 V
	50/60 Hz
	0.5/0.3A